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THORNTON (H. G.). **Soil microbiology.**—*Rep. Rothamst. exp. Sta., Harpenden, 1948*, pp. 36–40, 1949.

Examination by Dr. JANET MOLLISON of the roots of wheat taken at intervals from four Broadbalk continuous wheat plots and from a field at Great Harpenden, where wheat had not previously been grown for six years, showed that early in the season seedling roots from an unmanured Broadbalk plot were more heavily infected by a mycorrhizal Phycomycete [*Rep. Rothamst. exp. Sta., Harpenden, 1947*, p. 34, 1948] than those from any of the manured plots (which were all very much the same), though this difference decreased with the age of the plants. The wheat from Great Harpenden had little mycorrhizal infection until late in the season and then it was less general than at Broadbalk.

In pot experiments a mycorrhizal fungus in clover failed to establish itself in sterilized soil either from chopped infected roots or from infected seedling planted in it. New roots of such seedlings were not infected.

SCHEIDECKER (DANIELLE). **Utilisation de l'alcool éthylique comme unique source de carbone par le Fusarium solani.** [Utilization of ethyl alcohol as the sole source of carbon by *Fusarium solani*.]—*Rev. gén. Bot.*, 57, 672, pp. 78–91, 2 graphs, 1950.

Evidence is presented from work at the Plant Physiology Laboratory, Paris, showing that *Fusarium solani* var. *minus* [*Hypomyces haematococcus* var. *breviconus*] is able to grow actively in ethyl alcohol (20 p.p.m.) and make use of the compound as its sole source of carbon.

WRIGHT (N. S.). **Witches' broom of Potato in British Columbia.**—Abs. in *Proc. Canad. phytopath. Soc.*, 17, p. 11, 1950.

Witches' broom virus disease of potato, although of world-wide distribution [C.M.I. map no. 115], is apparently of economic importance only in the north-western United States and western Canada. There is some evidence of a possible relationship between potato witches' broom virus and aster yellows virus.

BRANDT (H.). **Versuche über die Bekämpfung von Blattläusen an Kartoffeln zur Verminderung der Viruskrankheiten.** [Experiments on the control of Potato aphids for the reduction of virus diseases.]—*Pflanzenschutz*, 1, 7, pp. 84–86, 1949.

In 1947 the Bavarian Institute of Agriculture and Plant Protection enlisted the co-operation of two other Institutes (Heidelberg and Hohenheim) and three plant protection stations (Stuttgart, Frankfurt-am-Main, and Kassel-Harleshausen) in the performance of large-scale experiments (which are still in progress) to determine the effect of aphid control as compared with selective procedures on the incidence of potato viruses [*R.A.M.*, 29, p. 225 and next abstract]. This is a tabulated summary

of some of the results obtained to date, using class A seed of the Ackersegen and Voran varieties.

In 1947 the maximum number of aphids per 100 leaves on Ackersegen on the three experimental farms belonging to the Bavarian Institute was 222·5 (on 26th July) and on Voran 498 (on 23rd). *Doralis* [*Aphis*] *rhamni* was the predominant species, *Myzodes* [*Myzus*] *persicae*, the principal agent of virus transmission, comprising only 5 to 10 per cent. of the total [cf. *R.A.M.*, 28, p. 301]. According to Dr. Hochapfel in *Badisch. landw. Wbl.*, 22nd April, 1948, on one of the Heidelberg farms, situated on a spur of the Odenwald, the number of *M. persicae* on early potatoes at the beginning of July ranged from 96 to 320 per 100 leaves, as against 2,000 to 6,000 on another in the Rhine Valley. Of the two insecticides tested on the Bavarian farms in 1947, one, E605f, reduced the number of aphids from 222·5 to 2·5 per 100 Ackersegen leaves and from 339·5 to 37·5 on Voran. In 1948 the aphid population was too small to permit conclusions to be drawn.

The appraisal of the value of selective procedures in virus control was complicated in 1947 by the persistent sunny, dry weather, which masked the virus symptoms in the early stages, with the result that roguing was deferred until too late to be effective.

SPRAU (F.). **Methoden zum Nachweis der wichtigsten Kartoffelvirosen.** [Methods for the diagnosis of the principal Potato viruses.]—*Pflanzenschutz*, 1, 7, pp. 78–83, 1949.

Following some introductory remarks on the importance of potato viruses, especially leaf roll, in Germany [see preceding abstract], the writer describes four methods for their identification, namely, 'eye cutting' or 'shoot eye' (tuber-indexing) [*R.A.M.*, 4, pp. 236, 656, *et passim*], aphid transmission, use of test plants, and the serological technique, concluding with a brief note on the use of the several procedures in practice.

MATTHEWS (R. E. F.). **Studies on Potato virus X. I. Types of change in Potato virus X infections. II. Criteria of relationships between strains.**—*Ann. appl. Biol.*, 36, 4, pp. 448–474, 2 pl., 1 graph, 1949.

The author describes experiments at the Molteno Institute, Cambridge, in which mild and severe strains of potato virus X [*R.A.M.*, 28, p. 320; 29, p. 114] were isolated in single-strain culture in plants of White Burley tobacco by inoculating with highly diluted sap from plants infected from a large selection of potato plants. In these dilution experiments five local-lesion type strain mixtures were investigated. The number of systemic spots (counted when systemic symptoms were well developed three weeks after inoculation) decreased with dilution from 10^0 to 10^{-3}, after which it remained fairly constant. It is believed that this was due to the occurrence of new mutations independent of dilution. Chlorotic and necrotic local lesions, however, decreased constantly down to 10^{-5} dilution, suggesting that no mutations arose. Single lesion cultures of mottle strains usually gave rise to severe strains, but the reverse did not occur. Two mottle strains, T.B.R. [loc. cit.] and B (from Duke of York), however, did not give rise to any severe strains over a two-year period.

Symptoms produced in *Cyphomandra betacea* by potato virus X are variable and it has been concluded that this plant selects out severe strains at the expense of mild ones from a pre-existing mixture containing predominantly mild strains.

In field tests in 1946 the numbers of Gladstone, Great Scot, and Kerr's Pink developing infection when inoculated with the strains K.P. (mild mixture from Kerr's Pink), T.B.R., and A.P. (ring spot type from Arran Pilot) were 16, 11, 5; 16, 11, 1; and 16, 3, 15, respectively. In 1947 the same three strains bulked in tobacco, A.P. passed through Arran Victory in 1946, and Clinch's 'severe X' [ibid.,

26, p. 122] grafted to Arran Victory were tested on the same three potato varieties. No plants were infected by T.B.R. and A.P., the numbers for K.P. being 19, 19, 27, A.P. ex Arran Victory 11, 15, 10, and 'severe X' 27, 24, 27. Prior to this investigation T.B.R. and A.P. had undergone 11 and 20 transfers, respectively, in non-potato hosts, 30 months in all, after which they were unable to infect potato. Thus there is strong evidence that the strains of virus X used progressively lost infectivity for potato after culture in non-potato hosts.

Tubers from the 1946 crop were grown on in 1947. Of those originally containing A.P., 13 out of 19 Kerr's Pink showed infection and nine out of 17 Gladstone; the corresponding figures for T.B.R. were two out of 16 and 11 out of 15. Of 17 Great Scot from T.B.R. plants four were infected [cf. ibid., 29, p. 224].

Observations are described where plants inoculated with mixtures of mainly mild strains with a few severe ones at first showed no symptoms but tubers in the next season had more severe infection. The author thinks that in virus X infection marked and apparently spontaneous increases in the severity of the dominant strain may occur in potatoes in the field.

The second paper records the range and type of symptoms produced by 12 different strains of virus X and the relationships between them. It is clear that a very large number of strains of the virus occur and those described no more than indicate the range there may be. Strains from White Burley tobacco, *Nicotiana glutinosa*, and *Datura tatula* were found which, under the same environmental conditions, produced widely differing symptom pictures ranging from no symptoms to severe necrosis. Six of the strains were identical in serological cross-absorption tests, and two (T.B.R. X and B) differed considerably from the others. It may be possible to prepare strain-specific antisera. The mild strains T.B.R. X and B gave only partial protection against severe strains in tobacco and *D. tatula*, and there must be a correlation between wide serological differences and a breakdown in the protection afforded in the plant. There was no correlation between type of symptoms caused and serological relationships.

Black (W.). **Inheritance of resistance to blight ('Phytophthora infestans') in Potatoes : comparison of A and B strains.**—*Proc. roy. Soc. Edinb.*, Sect. B, 63, Part III, 20, pp. 290–301, 2 diags., 1949.

Continuing his studies on potato blight (*Phytophthora infestans*) [*R.A.M.*, 25, p. 230; 28, pp. 305, 479] the author found that the segregations from triple hybrids of Ra constitution, tested with strain A, and of Rb, tested with either strain A or strain B, are similar in character, showing consistently an excess of recessive segregates. An unexpected increase in the infective power of strain B was denoted by a change in the character of segregations in one breeding line; the gene conferring resistance to the original B strain was ineffective against the more virulent form and the segregation ratios changed accordingly.

Plants possessing Ra but not Rb were as susceptible to strain B as were recessive types. It would seem that strain B, judging from its infrequent appearance in the field, is able to make headway only in an environment having varieties resistant to strain A, where it is protected from competition. Specialization in parasitic fungi need not imply additional danger to crops ordinarily susceptible, and in the ordinary course of events most mutant forms are probably short-lived. This low survival value in the face of competition would explain why new strains of blight were not found during a survey of the disease in Scotland [ibid., 26, p. 506].

Ayers (G. W.). **Fusarium storage rot of Potatoes.**—Abs. in *Proc. Canad. phytopath. Soc.*, 17, pp. 11–12, 1950.

Fusarium sambucinum f. 6 is at present the only species causing economic losses in stored potatoes in Prince Edward Island [*R.A.M.*, 28, p. 441]. Infection was

high in 1946 and 1947 but few cases of severe rot occurred in the 1948 crop. Cultural studies have demonstrated considerable variation in spore size and appearance of colonies within the species. Preliminary tests indicated more ready ultimate infection when wounded tubers were stored at low temperatures. High initial storage temperatures appeared to facilitate rapid drying of wounds and exclusion of the fungus. There was a slow development of rot at 35° to 40° F. over a 30-day period but at 45° to 50° it progressed rapidly.

Burkholder (W. H.) & Smith (W. L.). **Erwinia atroseptica (Van Hall) Jennison and Erwinia carotovora (Jones) Holland.**—*Phytopathology*, 39, 11, pp. 887–897, 1949.

Of the 61 isolates of *Erwinia* from potato and other hosts studied at Cornell University, New York, 31 were referred to *E. atroseptica* and 30 to *E. carotovora* [syn. *E. phytophthora*: *R.A.M.*, 28, pp. 384, 417; and above p. 252]. The former species appears to be more stable than the latter. Black leg symptoms were induced in potatoes by *E. atroseptica* only. Differences between the two species in culture include the utilization of ethyl alcohol, dulcitol, sodium hippurate, sodium malonate, and sodium urate by *E. carotovora* but not by *E. atroseptica*; the more compact colonies of the former on starch agar; and the rather higher temperature range of *E. carotovora*, few isolates of which would grow below 6° C., while the minimum for *E. atroseptica* was 3°; all the strains of *E. carotovora* grew at 35° and two made slight growth at 37°, whereas the optimum for *E. atroseptica* was 31° with a maximum at 35°.

Black leg has been steadily increasing of late years in New York State, and local observations as to its transmission through the tuber, to the extent of 6 or 7 per cent., have raised the problem of its inclusion in the seed potato certification programme, in which it does not figure at present [ibid., 17, p. 700].

Juillet (A.) & Turquois (J.). **Rôle de produits anticaries dans le traitement des semences de Riz.** [The rôle of anti-bunt products in the treatment of Rice grain.]—*C. R. Acad. Agric. Fr.*, 36, 1, pp. 29–32, 1950.

In experiments carried out near Beaucaire (Gard), Balilla and Razza 77 rice grain was treated with fungicides, partly as a preventive measure against possible attack by *Helminthosporium oryzae* [*Ophiobolus miyabeanus*], though this disease does not at present threaten the rice grown on the island of Camargue, France.

Under laboratory conditions the best effect on germination was given by mercoran (a dust containing methoxy-ethyl-mercury silicate), which at temperatures most favourable to germination (25° to 27° C.) increased it by 4 to 5 per cent.; at less favourable temperatures (14° to 18°) it increased germination by over 25 per cent.; germination was also accelerated. Dosage at 0·03 gm. mercury per kg. seed was insufficient, and 0·09 or 0·12 gm. is recommended for rice. The favourable effect of the mercoran appears to be related to its strong sterilizing effect on the culture medium (water or water and soil). Copper carbonate preparations, used at 0·2 gm. copper per kg., increased germination and appreciably accelerated it, but had a toxic effect on the embryo. Those containing hexachlorobenzene increased germination, but did not permanently accelerate it.

In a field test germination occurred 72 hours earlier in Razza 77 treated with mercoran (0·06 and 0·09 gm. per kg.) than in the untreated and was much more abundant at the higher dosage. The shoots from treated seed appeared above the surface of the water six to eight days earlier than the untreated, and throughout the summer growth in the former was more dense and more rapid. At harvest on 27th September the untreated part yielded 2·6 kg. paddy rice per ha. and the treated 3·45 kg. Further, the loss [of weight] caused by dehusking the rice was nearly 4 per cent. less in plants from treated grain than in those from untreated.

Bugnicourt (F.). **Les espèces du genre Curvularia isolées des semences de Riz.** [Species of the genus *Curvularia* isolated from Rice grain]—*Rev. gén. Bot.*, 57, 672, pp. 65–77, 2 pl., 1950.

The results are given of a systematic study at the Phytopathological Laboratory, Noumea, New Caledonia, of the following species of *Curvularia* isolated from rice grain: *C. maculans* [*R.A.M.*, 16, p. 491] in Indo-China, *C. oryzae* n.sp. in Cochin China, *C. lunata* [ibid., 27, p. 314] in Indo-China and New Caledonia, *C. geniculata* [ibid., 24, p. 221; 26, p. 406] in Indo-China, and *C. uncinata* n.sp. in Cochin China, *C. oryzae* has brownish, simple, septate, nodulose conidiophores, 3·3 to 5·5 μ in diameter and lateral or acrogenous, triseptate, straight conidia measuring 26·4 to 42·8 by 10·9 to 26·4 μ on potato glucose agar and 28·2 to 41 by 11·4 to 23·2 μ on Knop's oat agar. *C. uncinata* has brown, simple, septate conidiophores 3 to 8·5 μ in diameter; the lateral or terminal conidia have three to four septa (up to 7 on potato glucose agar) and measure 17·3 to 38·2 by 8·2 to 13·7 μ on this medium and 16·4 to 25·5 by 8·2 to 12·3 μ on Knop's oat agar.

Experimental inoculations of Sarundum and Ganda rice grain, grain in husk, and seedlings showed that virulence (as estimated by percentage mortality up to 40 days after inoculation) was greatest with *C. uncinata* on Sarundum rice and *C. oryzae* on Ganda. The commonest species, *C. lunata*, detected on 5·8 per cent. of the 4,500 grains examined, caused relatively high mortality in both varieties; *C. maculans* was the least virulent of the species. *C. maculans*, *C. lunata*, and *C. geniculata* were encountered frequently on *Hevea* rubber tapping panels attacked by *Phytophthora palmivora* in Cambodia and Cochin China.

McClung (N. M.). **Morphological studies in the genus Nocardia. I. Developmental studies.**—*Lloydia*, 12, 3, pp. 137–177, 18 pl., 3 figs., 1949.

In morphological studies of the mycelial development of 61 strains of *Nocardia* (*Proactinomyces*) [*R.A.M.*, 25, pp. 48, 321] isolated from 23 soil samples collected in the vicinity of Ann Arbor, Michigan, and of other strains obtained from 'type' culture collections, three types of fragmentation were distinguished (*a*) at an angle formed in a hypha, the new hyphal tips growing out parallel to each other, (*b*) in a straight or slightly curved portion of a hypha; the newly formed ends bend slightly and grow past each other, and (*c*) close to or at the juncture of a branch; a new hypha may grow from the place of division at the base of the branch. The author is able to distinguish three morphological groups in the genus. In I there is scant mycelial development, sparse branching, and type (*a*) fragmentation; colony texture is soft, pasty, and sometimes mucoid; pigment is intracellular and insoluble. In II there is extensive mycelial development with straight branches which do not overlap, and type (*c*) fragmentation; colonies are soft and pasty, pigment is intracellular and insoluble. Type (*b*) fragmentation may occur in either of these groups. In III there is extensive mycelial development, no fragmentation, branches are profuse, contorted, and overlapping; colony texture is waxy or cartilaginous; generally both intracellular and soluble pigments are produced.

Nutman (F. J.) & Sheffield (F[rances] M. L.). **Studies of the Clove tree. I. Sudden-death disease and its epidemiology.**—*Ann. appl. Biol.*, 36, 4, pp. 419–439, 2 pl., 3 diags., 1 graph, 4 maps, 1949.

Sudden death disease of cloves [*R.A.M.*, 23, p. 40; 29, p. 172] has been present in Zanzibar and Pemba for many years, but recently has assumed alarming proportions on the former island and is steadily increasing on the latter, where no clove-growing region is free from outbreaks. Thus the entire clove industry of the Protectorate is threatened. The disease also occurs in Madagascar, though to a lesser degree.

The first symptom is always a very slight general chlorosis, after which the disease takes a course that varies widely between two extremes. The first is a very gradual decline, mostly of young trees (up to 20 years), often taking six or more months. The chlorosis increases and the older leaves fall prematurely. Usually the tree wilts and dies before all the leaves have fallen, but sometimes all the leaves are shed first. In the second course the disease takes only a few days to kill an apparently healthy tree. After the almost imperceptible initial symptoms, which may persist for many weeks, leaves are shed rapidly, forming in the most acute cases a heavy carpet of green and yellow leaves. Simultaneously a slight general wilt sets in and increases rapidly, preventing abscission. The remaining leaves dry on the tree, turning a conspicuous, bright russet red. During 1948 the authors found the more usual mode of death to lie between the two extremes, but tending towards the first, 'sudden' death being comparatively rare. Many suspected trees appeared to recover during the heavy monsoon rains, apparently owing to the more readily available water supply. With the onset of dry weather, however, they were killed rapidly. Loss of absorbing roots accompanies the disease and by the time the final wilt sets in they are almost gone; the main root system, on the other hand, seems to remain healthy.

Trees of all ages are affected, although losses of young trees are much less than those of older ones. Plantations consisting only of young trees are rarely attacked. The sporadic type of outbreak, apparently common in Zanzibar at one time, ceases to spread after killing about a dozen trees. Many older clove plantations have isolated bare patches sometimes replanted with young trees. The epidemic type of outbreak with peripheral spread is prevalent in Pemba, but rare in Zanzibar. The disease often kills all the trees in its path, irrespective of age, leaving completely cleared patches. This type often gives rise to smaller outlying outbreaks, which spread and frequently coalesce. The diffuse epidemics common in Zanzibar are really active zones adjoining devastated regions, with an evenly distributed, high death rate.

A survey of Pemba in 1948 disclosed some 500 outbreaks, most of which are small with less than 50 trees affected, but some are very large, up to a mile in length. One of these advances at the rate of one row every six weeks. The death rate is estimated at 300 trees in the past five years. In Zanzibar, after leaving devastated about half the clove-producing area, the disease is advancing northwards, the front involving almost the whole width of the clove belt. The active peripheral zone is often many hundreds of yards wide. A few outbreaks are in advance of this front and some areas not attacked in the first wave of disease are now succumbing as are also some regenerated parts. The authors estimate that at least half of the mature clove trees in Zanzibar have died during the past 10 to 12 years, and in a relatively short time all will probably succumb.

All evidence strongly suggests that sudden death is of virus origin. The suspected vector is probably lethargic since the disease spreads rapidly only where there is a close canopy, and a scale insect (a new species of *Saissetia*) is suggested. It is cultivated in enormous numbers and transported by the red tree ant, *Oecophylla longinoda* var. *textor*, widely distributed in Zanzibar and Pemba. The ants appear to form communities on single trees or ones whose canopies are in contact. They leave trees affected by sudden death just before the wilt stage, carrying the scale to their new colonies, preferably on mature cloves, often hundreds of yards away. The ant and the scale insect were found invariably on trees affected by sudden death. Further work is in progress.

LANGDON (R. F. N.). **Records of Queensland fungi, V.**—*Pap. Dep. Biol. Univ. Qd*, 2, 9, 9 pp., 1948.

Included in this further contribution to the knowledge of Queensland fungi

[*R.A.M.*, 25, p. 422] are *Peronospora parasitica* causing hypertrophy of *Coronopus didymus*, a new host for the State; *Pseudopeziza medicaginis* on *Medicago denticulata*, another new host record; *Entyloma australe* on *Physalis peruviana* [ibid., 20, p. 597]; *Tolyposporium paspali* n.sp. on *Paspalum distichum*; *Puccinia hieracii* [ibid., 26, p. 143] on chicory; and *Cerebella inquinans* on honeydew of ergot (*Claviceps* sp.) on a number of grasses [ibid., 21, p. 526].

Langdon (R. F. N.). **Notes on some fungi from New Guinea.**—*Pap. Dep. Biol. Univ. Qd*, 2, 9, 3 pp., 1948.

Among the few parasitic fungi collected by the author in 1943 and 1944 in Papua and the Mandated Territory of New Guinea were *Cordyceps muscae* on *Sarcophaga* sp. and *Helminthosporium ravenelii* on *Sporobolus diander* [cf. *R.A.M.*, 21, p. 129].

Hughes (S. J.). **Studies on micro-fungi. II. The genus Sporoschisma Berkeley & Broome and a re-description of Helminthosporium rousselianum Montagne.**—*Mycol. Pap., Commonw. mycol. Inst.*, 31, 34 pp., 1 pl., 9 figs., 1949. 5*s.* 0*d.*

In this monograph of the genus *Sporoschisma*, re-descriptions are given of three species and a fourth is described as new. Reasons are given for the exclusion of other species. *Helminthosporium rousselianum* is emended and re-described.

Thirumalachar (M. J.). **Elsinoe viticola from India.**—*J. Wash. Acad. Sci.*, 40, 1, pp. 21–22, 5 figs., 1950.

From chalky-white, corrugated lesions, which later turned greyish-brown with black patches, present on leaves of *Tetrastigma sulcatum* growing in Mysore, the author isolated *Elsinoe viticola* [*R.A.M.*, 23, p. 81]. Sections through recently infected areas disclosed the *Sphaceloma* state, hitherto unknown. The numerous, ovate to spherical, thin-walled, hyaline conidia, produced acrogenously, measured 4·5 to 6 by 4 to 4·5 μ. This is the first record of the fungus outside the type locality in Java. Studies are in progress on the ascigerous state.

Pirie (N. W.). **Biochemistry department.**—*Rep. Rothamst. exp. Sta., Harpenden, 1948*, pp. 57–60, 1949.

Preparations of tobacco necrosis virus [*R.A.M.*, 28, p. 290; 29, p. 246], using a standard method of purification, two or three cycles of ultracentrifugation, and low-speed centrifugal clarification, were made from [tobacco] leaves subjected to a wide range of pre-treatments. The age of the infected leaf and the duration of infection do not have a great effect on the properties of the virus, but the conditions under which the detached leaf and the sap are kept do exert a marked influence. Most treatments of the leaf, e.g., freezing, wilting, and exposure to chloroform vapour, tend to inactivate the virus. Ageing the sap for a few days, freezing, or exposure to chloroform cause activation. This effect is due partly to the removal of unstable normal proteins, but the results cannot be explained merely on a basis of dilution of the final preparations to different extents by normal proteins. All infective preparations contain at least three distinct substances, the infective virus, a serologically active sedimentable nucleoprotein, which is either a derivative of the virus or a product of the deranged metabolism of the infected leaf, and normal sedimentable nucleoprotein, which can also be extracted from uninfected leaves. An attempt is in progress to define the relationship of these substances to one another.

Stepka (W.) & Takahashi (W. N.). **Amide constituents of Tobacco mosaic virus protein.**—*Science*, 111, 2877, pp. 176–177, 1 fig., 1950.

Investigations employing paper partition chromatography carried out at the University of California, Berkeley, confirmed the presence of all the amino acids

previously reported to be constituents of tobacco mosaic virus protein [*R.A.M.*, 29, p. 126], extracted from greenhouse-grown Turkish tobacco leaves infected for 20 days. In addition, the presence of the amide asparagine was demonstrated and the probable occurrence of glutamine suggested.

RILEY (E. A.). **Pathological and physiological studies on the brown spot disease of Tobacco caused by Alternaria longipes (Ell. & Ev.) Mason.**—*Mem. Dep. Agric. S. Rhod.* 3, 32 pp., 3 pl., 3 diag., 1 fig., 3 graphs, 1949.

These studies on *Alternaria longipes* [*R.A.M.*, 28, pp. 209, 312], the causal organism of brown spot of tobacco, were carried out under greenhouse conditions at the Imperial College of Science and Technology, London, during 1947–8. The minimum temperature for infection of tobacco leaves by spore suspensions of the fungus was found to be about 18° C. and the optimum about 30° [cf. ibid., 10, p. 764]. On culture media the optimum temperature for growth was between 25° and 30° and the minimum about 10°. Optimum growth occurred over the range pH 5 to 7. Sporulation was relatively higher at pH 7 and 8 than in highly acid media.

Inoculations of various solanaceous plants showed that they are only slightly susceptible [cf. loc. cit.]; the lesions were of the usual zonate type, but lacked the yellow halo produced on mature tobacco leaves [ibid., 25, p. 529]. Wound inoculation of [chilli] pepper pods resulted in the development of soft rot [ibid., 27, p. 458]. In resistance tests with tobacco varieties commonly grown in Rhodesia, namely, Bonanza, Jamaica Wrapper, Willow Leaf, and White Stem Orinoco, the last-named was much less susceptible than the others, developing spotting on the lower leaves only. Inoculated tobacco seedlings showed a low rate of infection. Water-soaked spots ($\frac{1}{2}$ to 1 mm.) appeared after eight to nine days, and later dried and became brown. The spots did not spread, except on the yellowing cotyledons. The yellow halo did not develop. In infected seedlings grown on for two months there was a slow progression of the disease up the plants, typical symptoms developing on the mature leaves. The fungus penetrated the cuticle of seedlings, tops, and mature leaves by short, stout germ tubes after 48 hours. The yellow halo was consistently absent in seedlings and tops. It is possible that their resistance is the result of an unfavourable medium for the development of some toxic substance produced by *A. longipes*. Percentage germination of spores was lower on seedlings and tops than on mature leaves, probably due either to secretions of the glandular hairs on the leaves or diffusates from them. Percentage germination in water drops taken from leaves and in leaf extracts was little different from that in distilled water. Germ-tube lengths were shorter at pH 8·7 (drops from seedlings) than at lower levels, and the pH factor is considered at least partly responsible for low percentage germination and infection in seedlings. High nitrogen concentrations markedly reduced growth of the fungus in culture, small doses of nicotine (up to 0·5 per cent.) appeared to stimulate it, but higher concentrations were depressant.

The results of a sand-peat culture experiment showed that the susceptibility of tobacco plants to inoculation with a spore suspension was influenced by the nature of the nutrient supply. Addition of $\frac{1}{2}$ per cent. dextrose to the inoculum reduced the onset of the disease from eight to four days. In the absence of phosphorus and potassium, nitrogen greatly increased the diameters of spots; potassium was more effective than phosphorus at low levels in decreasing the size of spots, while at higher levels the reverse was true. Medium nitrogen and low phosphorus and potassium favoured the disease, while plants grown at a high level of complete nutrient were the least susceptible. Fertilizers high in phosphorus and potash applied to the soil did not reduce infection significantly. Nitrogen applied as sodium nitrate produced less susceptible plants than ammonium sulphate.

Steinberg (R. A.). **The relation of certain soil bacteria to frenching symptoms of Tobacco.**—*Bull. Torrey bot. Cl.*, 77, 1, pp. 38–44, 2 figs., 1950.

When Maryland Medium Broadleaf tobacco seedlings were grown aseptically on a complete mineral agar at 25° C. [cf. *R.A.M.*, 27, p. 263] marginal inoculation of the medium with *Bacillus cereus* produced symptoms closely resembling those of frenching [ibid., 29, p. 232]. The effectiveness of *B. cereus* varied with the strain, the kind and amount of peptone used, and the concentration of inorganic nitrogen; bactotryptone at 200 p.p.m. in conjunction with 141 p.p.m. of inorganic nitrogen was most effective; 227 p.p.m. of inorganic nitrogen induced masking of the symptoms or delay in their appearance. It is suggested that diffusates from *B. cereus* and perhaps other soil bacteria may cause frenching of tobacco in the field.

Dickey (R. S.) & Ark (P. A.). **Injury caused by treating Tomato seed with mercurials.**—Abs. in *Phytopathology*, 39, 10, p. 859, 1949.

A considerable reduction of germination of Pearson tomato seed followed 10 to 15 minutes' treatment with mercuric chloride or new improved ceresan in greenhouse tests [in California] when the ratio of seed to fungicidal solution was 1 to 300 and the readings were taken after 32 days. Thus, ten minutes in mercuric chloride (1 in 1,000) resulted in 25 per cent. germination when the treated seed was unwashed and 70 per cent. when it was washed for 15 minutes, the corresponding figures for a 1 in 2,000 dilution being 68 and 84 per cent., respectively, and for 1 in 3,000 89 and 93. The germination of untreated seed ranged from 90 to 98 per cent. For new improved ceresan 1 in 1,250 the germination percentages were as follows: treated for 10 minutes, 50; the same followed by 15 minutes' washing, 83; untreated, 95, while the corresponding levels for the 1 in 3,750 dilution were 93, 95, and 98, respectively. It is concluded that seed treated with high concentrations of these two fungicides should be washed subsequently for at least 15 minutes.

Gäumann (E.). **Über den Mechanismus des infektiösen Welkens.** [On the mechanism of infectious wilting.]—*Biol. Zbl.*, 67, 1–2, pp. 22–26, 1948. [English, French, and Russian summaries.]

In this exposition of the mechanism of tomato wilt (*Fusarium* [*bulbigenum var.*] *lycopersici*) [*R.A.M.*, 27, p. 453] the author distinguishes two aspects of the process, namely, the pathological loss of water on the one side and the pathological wilting on the other. The threshold of excitation for these two effects being on different levels, one may be induced experimentally without the other.

Wilhelm (S.). **Vertical distribution of Verticillium albo-atrum in some California soils.**—Abs. in *Phytopathology*, 39, 10, p. 864, 1949.

Quantitative information on the vertical distribution of *Verticillium albo-atrum* in a variety of Californian soils [*R.A.M.*, 28, p. 245] was obtained by a standardized method in which infection of Bonny Best tomato plants was used as a measure of the intensity of infestation. In 20 depth samples from infested fields, representing mainly cotton, potato, or tomato land, the fungus was found in 19 instances at 0 to 6 in., 19 at 6 to 12, 10 at 12 to 18, 8 at 24 to 30, and 3 at 30 to 36. The factors controlling the vertical distribution of *V. albo-atrum* are believed not to be related to depth of root penetration, soil type, or climatic environment.

Miller (P. R.). **Pecan scab spray experiments in S. Carolina.**—*Agric. Chemicals*, 5, 1, pp. 47, 49, 70–71, 1950.

This information on the control of pecan scab (*Cladosporium effusum*) has already been noticed from other sources [*R.A.M.*, 28, p. 602; 29, p. 184].

Herbignat (A.). **Considérations générales sur le Peuplier. Types à cultiver en Belgique. Contrôle variétal. Rappel de quelques principes fondamentaux de sa culture.** [General considerations on the Poplar. Types for growing in Belgium. Varietal control. Review of some fundamental cultural principles.]—*Bull. Soc. for. Belg.*, 57, 1, pp. 1–41, 8 pl., 23 figs., 1950.

The poplars known to be resistant to bacterial canker in Belgium [*R.A.M.*, 14, p. 478; cf. 28, p. 315] are the male hybrids *Populus serotina*, *P. serotina erecta*, *P. robusta*, *P. gelrica*, and the female hybrid *P. marilandica* [ibid., 25, p. 323; 28, p. 316]. *P. serotina*, *P. robusta*, and *P. italica* are susceptible to attacks by *Dothichiza populea* [ibid., 25, p. 586]. Canker is controlled primarily by the use of resistant varieties and *D. populea* by using vigorous seedlings, transplanting rapidly, and by applying fertilizers regularly in the nurseries.

Fowler (M. E.). **Airplane scouting for pole blight of Western White Pine.**—*J. For.*, 48, 1, p. 23, 1 fig., 1950.

Aeroplane surveys were made in the summer of 1949 by the United States Division of Forest Pathology to determine the extent of pole blight of western white pine pine trees (*Pinus monticola*) [*R.A.M.*, 29, p. 65] over the Northern Rocky Mountain region, followed by ground inspections of suspected areas; large areas were also surveyed with field glasses from look-out towers. Aeroplane scouting proved to be very satisfactory, economical, and time saving. The disease was known to occur from British Columbia to southern Idaho; the survey confirmed all previously known localities near the southern limits of the disease, and several new localities were added. However, another summer season's work will be necessary to ascertain exactly the southern limits of the disease.

Calvert (O. H.) & Pound (G. S.). **Stimulated pycnidium production and symphogenous pycnidia in Phoma lingam.**—*Phytopathology*, 39, 10, pp. 848–857, 3 figs., 1949.

In the course of a study on induced variability in the Puget sound strain of *Phoma lingam* [from cabbage: *R.A.M.*, 29, p. 190] a heavy line of pycnidia developed in the zone of fusion between the A and B mycelial types previously described [ibid., 27, p. 306]. Samplings of spores from individual pycnidia taken from this zone almost invariably yielded both cultural types. It is believed that the two mycelia participate mutually in the formation of pycnidia, each abstricting its pycnidiospores within [cf. ibid., 8, p. 285]. Passage through host tissue did not alter the reciprocal reactions of the two types of *P. lingam*. The type A isolates varied considerably in cultural characters but reacted uniformly with those of type B, which were all identical and did not differ from the original local isolate.

Jones (J. O.) & Dermott (W.). **'Whiptail' in Cauliflower.**—*Nature, Lond.*, 165, 4189, pp. 248–249, 1950.

'Whiptail' of cauliflowers and broccoli [*R.A.M.*, 28, p. 369] is endemic in south-eastern England, especially on soils derived from the Hastings Beds, and occasionally causes severe losses. In 1949 a trial was carried out on a sandstone soil (pH 6) in a field where the trouble has been serious in recent years. Treatments with ground chalk at 2 tons per acre, chalk plus sodium molybdate at 10 lb. per acre, and sodium molybdate (10 lb.) resulted in 31, 12, and 18 per cent., 'whiptail', respectively, while the untreated had 69 per cent. Observations suggest that in certain cases 'whiptail' may be due to cultural causes rather than to molybdenum deficiency.

Koch (L. W.), Hildebrand (A. A.), & McKeen (C. D.). **Tetramethylthiuram disulphide, an effective soil fungicide.**—Abs. in *Proc. Canad. phytopath. Soc.*, 17, p. 15, 1950.

Field tests carried out over a two-year period confirmed greenhouse tests as to the effectiveness of soil applications of tetramethylthiuram disulphide (3 to 4 lb. per acre) in controlling black root of sugar beets in Ontario [cf. *R.A.M.*, 28, p. 556], the increase in seedling stands ranging from 22 to 239 per cent. In 1948 increases in yield were correlated with increased early stands of seedlings in soil treated with arasan. A combined seed and soil treatment with arasan controlled damping-off of [chilli] pepper, Spanish onion, and spinach seedlings [ibid., 28, p. 499]. Similar treatment proved toxic to lettuce and certain other vegetables.

Borzini (G.) & Picco (D.). **Accertamento della resistenza relativa di razze di Fagiolo allo Sclerotium rolfsii e ad una Rhizoctonia sp.** [Verification of the relative resistance of Bean races to *Sclerotium rolfsii* and a *Rhizoctonia* sp.]—*Notiz. Malatt. Piante, 1949*, 2, pp. 25–28, 1949. [Mimeographed.]

For some years past beans (*Phaseolus vulgaris*) growing in Latium, Italy, have been affected by a wilt. Young seedlings, 12 to 13 days after emergence, rapidly sicken and die in a few days, while older plants become arrested in growth and give a reduced crop. In 1947 Goidànich isolated *Macrophomina phaseoli* from affected material [*R.A.M.*, 27, p. 551]. In September, 1948, the senior author found that in this locality the only bean grown was Borlotto di Vigevano, of which two sub-races exist, one dwarf, the other climbing. In loose soil crop disease loss was estimated at 90 per cent. The disease was present in every plot, but *M. phaseoli* was not detected. A few plants had only pod infection by *Colletotrichum lindemuthianum*, while *Sclerotium rolfsii* and a *Rhizoctonia* species were isolated repeatedly, both being present occasionally on the same plant.

Inoculation experiments at about 14° C. demonstrated that both fungi were pathogenic to Borlotto di Vigevano bean seedlings, especially to very young ones. The two were mutually antagonistic. *S. rolfsii* was more strongly pathogenic than the *Rhizoctonia* and rapidly brought about the death of the seedlings with the characteristic wilt symptoms observed in the field. Both fungi were more virulent at 20° to 21° and 95 per cent. relative humidity that at 16° to 17° and 70 to 75 per cent. Regina alta di Monsummano was the most resistant of five varieties tested.

Hagborg (W. A. F.), Warner (Gladys M.), & Phillips (N. Agnes). **Use of 2,4-D as an inhibitor of germination in routine examinations of Beans for seed-borne infection.**—*Science*, 111, 2874, p. 91, 1 fig., 1950.

During the examination of seed samples of bean (*Phaseolus vulgaris*) at the Dominion Laboratory of Plant Pathology, Winnipeg, using Groves and Skolko's technique [*R.A.M.*, 24, p. 42], difficulties were experienced in detecting the presence of *Colletotrichum lindemuthianum* [ibid., 28, p. 510]. The addition to 20 per cent. malt extract agar of 50 p.p.m. acid equivalent of sodium 2,4-dichlorophenoxyacetate strongly inhibited germination of the seeds without causing any noticeable retardation of the growth of the fungus. There was some delay in growth at concentrations above 100 p.p.m. [cf. ibid., 28, p. 278], and different strains of the pathogen showed different degrees of tolerance to the higher concentrations of 2,4-D.

Chiavi analitiche delle principali malattie segnalate in Italia sulle piante coltivate. [Analytical keys to the principal diseases reported in Italy on cultivated plants.]—*Notiz. Malatt. Piante, 1949*, 5, pp. 5–16, 1949. [Mimeographed.]

The first of this series of keys, designed to facilitate recognition by growers and others, to the principal plant diseases (other than those of virus origin) in Italy is

by E. Baldacci and is for broad beans, runner beans [*Phaseolus vulgaris*], and peas. Following the keys are notes on the causal organisms, symptoms, distribution in Italy, damage caused, and control.

Grogan (R. G.) & Walker (J. C.). **A pod-distorting strain of the yellow mosaic virus of Bean.**—*J. agric. Res.*, 77, 11–12, pp. 301–314, 8 figs., 1948.

A pod-distorting virus isolated from naturally infected plants of Idaho Refugee, bean (*Phaseolus vulgaris*) highly resistant to bean mosaic virus [see next abstract], and from other varieties at Madison, Wisconsin, during the summer of 1946, was found to be closely related to common bean mosaic virus and bean yellow mosaic virus [*R.A.M.*, 28, p. 105], and is thought to be a strain of the latter. Yellow mosaic is very important in western areas of the State where the susceptible Stringless Blue Lake is the variety most commonly used for canning. It is not yet known whether the pod-distorting strain occurs in these areas.

A typical strain of yellow mosaic infected all varieties of beans tested. The pod-distorting virus infected all but UI 59, UI 81, and UI 123, and caused severe top necrosis on several varieties which developed only a slight stunt and mottle when infected with yellow mosaic. Of 20 other leguminous varieties and species tested, seven, including Perfected Wales pea and Canadian field pea, were susceptible to both viruses, six were susceptible to typical yellow mosaic and highly resistant to the pod-distorting virus, and seven, including Wisconsin Perfection pea and Henderson Bush Lima bean [*P. lunatus*], were not infected by either. Since the white and yellow sweet clovers (*Melilotus alba* and *M. officinalis*) proved immune from or highly resistant to the pod-distorting virus they cannot serve as overwintering hosts as they do commonly for typical yellow mosaic virus.

The pod-distorting virus was transmitted by *Myzus persicae* to five out of 12 healthy bean plants in two tests. No seed transmission was detected in 445 seeds from infected plants. In cross-inoculation studies bean mosaic virus completely inhibited the development of the pod-distorting strain in Michelite bean plants. In its properties the pod-distorting virus conformed to those of bean mosaic and yellow bean mosaic.

Grogan (R. G.) & Walker (J. C.). **The relation of common mosaic to black root of Bean.**—*J. agric. Res.*, 77, 11–12, pp. 315–331, 8 figs., 1948.

Idaho Refugee, Wisconsin Refugee, Sensation Refugee 1066, Sensation Refugee 1071, and U.S. No 5 Refugee bean (*Phaseolus vulgaris*) varieties are considered to be highly resistant to bean virus 1 [bean mosaic virus: see preceding abstract] as they do not become infected by mechanical inoculation and the virus is not recovered from the inoculated plants. In some of these varieties resistance is derived from Corbett Refugee, a descendant from a highly resistant plant in a field of infected Stringless Green Refugee [*R.A.M.*, 15, p. 766]. They are susceptible, however, to some strains of bean virus 2, the cause of yellow mosaic [loc. cit.]. During the course of studies on several strains of these viruses an occasional Idaho Refugee plant developed systemic necrosis and died. No bacterial or fungus pathogen could be detected, and numerous inoculations with yellow mosaic virus failed to produce this necrosis. Only when the plants were inoculated with common mosaic virus alone or with both viruses did the necrosis appear. The symptoms on mature plants were identical with the disease described as black root [ibid., 20, p. 620].

Varieties in which resistance has been derived from Robust or Great Northern evidently possess a high degree of resistance to or immunity from common bean mosaic, since they showed no systemic necrosis in either young or old plants and did not develop black root symptoms. The varieties susceptible to Burkholder's

strain [ibid., 23, p. 207], but immune from the common strain of bean virus 1, also did not develop black root.

The fact that the incidence of black root is very low in all varieties having the Corbett Refugee type of resistance, even when they are growing in fields adjacent to susceptible varieties with a high percentage of bean mosaic, is probably partly due to the fact that most of the infected plants develop systemic necrosis and die before pod formation, thus reducing seed transmission to a minimum. They also possess 'field resistance', which makes the incidence of insect transmission of common mosaic very low. Although the nature of 'field resistance' is not understood, observations on small localized necrotic areas in leaves on which viruliferous aphids (*Myzus persicae*) had fed, indicate that it may be based on a hypersensitive reaction of the tissue to infection. Usually this results in a small, local necrotic area or fleck in which the virus is usually inactivated, while in a very few cases systemic necrosis and black root occur. When inoculations are made by approach graft or hypodermic injection the chances of a systemic reaction are greatly increased. When severe damage from systemic necrosis occurs the virus usually becomes inactivated in the early stage of disease development.

McClure (T. T.). **Mode of infection of the Sweet-Potato wilt Fusarium.**—*Phytopathology*, 39, 11, pp. 876–886, 3 figs., 1949.

At the University of California, Berkeley, the principal channels of infection of Porto Rico sweet potato sprouts by *Fusarium oxysporum* f. *batatas* [*F. bulbigenum* var. *batatas*: *R.A.M.*, 28, p. 193] were found to be vascular wounds, e.g., newly cut stems or roots, or fresh leaf scars. Invasion did not occur through uninjured stems or roots, root eruption wounds, or the callus of a healed basal wound. This is a matter of great importance in connexion with control practices. Tobacco, the other known host of the fungus [ibid., 22, p. 456], contracted infection through roots cut or damaged in transplanting, but remained healthy when inoculated without wounding.

Monospore isolates of the stem rot pathogen were separable into two culturally recognizable groups, of which I, believed to correspond to *F. bulbigenum* var. *batatas*, is characterized on potato dextrose agar by a profuse violet to white aerial mycelium; abundant macroconidia, slow development of sporodochia; producing mostly tri- to quinqueseptate macroconidia, the former averaging 35·3 by 3·4 μ; and numerous small, blue plectenchymatous masses. The sporodochia of the group II, similar to those of *F. oxysporum* f. 2, are found freely in culture, often on purple sclerotial-plectenchymatous masses of variable size; the triseptate macroconidia average 33·9 by 4·2 μ.

Imai (M.), & Aisawa (T.). **Volvaria bresadolae Trotter, a fungus cultivated in the tropics.**—*Kagaku Nanvo* (*Sci. South Seas*), 5, 1, pp. 55–61, 1942. [Japanese. Abs. in *Biol. Abstr.*, 23, 9, p. 2819, 1949.]

The authors found *Volvaria bresadolae* growing on discarded, decaying pineapple fruits in the Palau Islands. The value of this fungus as a food and possible methods of growing it are discussed.

Catoni (G.) & Refatti (E.). **Un cinquantennio di dati sulla 'Peronospora' della Vite nella Venezia Tridentina.** [Fifty years of data on *Peronospora* of the Vine in Tridentine Venezia].—*Notiz. Malatt. Piante, 1949*, 2, pp. 29–33, 1 map, 1 graph, 1949. [Mimeographed.]

For each year from 1899 to 1949, inclusive, the date of the first appearance of vine mildew (*Plasmopara viticola*) in Tridentine Venezia, the locality of the occurrence, and the degree of infection (severe, medium, or slight), which developed on the

leaves and on the fruit, are tabulated. There appears to be no relation between the date and gravity of subsequent infection. Maximum frequency of time of first appearance is from 16th to 20th May. Maximum frequency of intensity of attack on the leaves appears to be low and on the bunches high.

Desflassieux (A.). **Traitement simultané du mildiou et de l'Oidium par le complexe verdet-permanganate.** [Simultaneous treatment of mildew and *Oidium* by the copper acetate–permanganate complex.]—*C. R. Acad. Agric. Fr.*, 36 [35], 14, pp. 606–611, 1949.

Good results have been obtained at Colombier and Monestrol by spraying vines and fruit trees with a mixture of 1 kg. copper acetate in 90 l. [water] and 0·125 kg. [potassium] permanganate in 10 l. The permanganate is dissolved separately and poured straight into the copper acetate without the addition of any wetter, and the mixture can be kept for some hours. Three treatments are usually given [on vines], the first at bud-burst, when the shoots are a few cm. long, which acts upon the first conidia of *Oidium* [*Uncinula necator*: *R.A.M.*, 27, p. 507; 28, pp. 375, 376, 617], the second a fortnight later, when the shoots are 15 to 20 cm. long, and the third shortly before flowering. No burning is caused, and in 1948–9 even very early vines, such as Perle de Csaba, Lucien Baltes, and Primus, which are highly susceptible to *U. necator*, showed no infection after this treatment. At flowering one dusting with sublimated sulphur suffices to protect the leafy parts which sprays cannot reach. After flowering the copper acetate–permangante treatment should be repeated, reducing the dosage of copper acetate to not less than half if the weather is not favourable for mildew [*Plasmopara viticola*: loc. cit.]. Applications are repeated until the berries begin to ripen, when a further application of sublimated sulphur is made. By 15th August all vines and fruit trees treated by this method were found to be in excellent condition, the early varieties, Csaba, Baltet, Primus, Volta, Pirevano 106, and Sicilien all giving a perfect crop. A further advantage of this mixture is that it prevents fermentation due to rotting when harvesting is carried out in rainy periods; in such circumstances the formula used is 0·2 kg. copper acetate and 0·15 kg. permanganate per hl. of spray. In 1949, 35 ha. of vines and 12 ha. of fruit trees were treated with 300 kg. neutral emerald copper acetate and 40 kg. permangante at a cost, for the materials, not exceeding 200 fr. per kg. The treatment cannot be used in combination with wettable sulphur.

The same method is used for peaches against *Monilia* [*Sclerotinia fructigena* and *S. laxa*: ibid., 27, p. 429] and *Coryneum* [*beijerinkii*: *Clasterosporium carpophilum*: ibid., 19, p. 104; 27, p. 75] in October, and against leaf curl [*Taphrina deformans*: ibid., 26, p. 285; 27, p. 510] in spring. An application in October with 1 kg. copper acetate and 0·3 kg. permanganate [per hl.] prevented the leaves from falling, re-invigorated them, and restored their green colour.

Terrier (C.). **Les problèmes que pose la lutte contre le coître.** [The problems involved in the control of white rot.]—*Rev. romande Agric., Vitic., Arboric.*, 5, 12, pp. 89–91, 2 graphs, 1949.

The most promising material so far tested for the control of vine white rot (*Coniothyrium diplodiella*) [*R.A.M.*, 27, p. 376] is 0·5 per cent. neutral oxyquinolinol sulphate (tumex), used with 0·1 per cent. wetter. Applied at Aubonne seven hours after hail on 16th July, 1949, it reduced the percentage of rotted grapes on 17th August from over 18 per cent. to 3 per cent. Its efficacy varies, however, because the material tends to be washed away by rain, it also reacts with the copper sprays to form an insoluble compound inactive against white rot, and when it comes into contact with grape juice it is less toxic. Infection after hail damage, therefore, is often severe. Non-neutralized copper sulphate (0·3 per cent. with 0·5 per cent. wetter) and 2 per cent. Bordeaux mixture are virtually inactive against the fungus,

but have a certain efficacy because of their cauterizing effect on wounds; they should be used if oxyquinolinol is not immediately available.

Iljin (W. S.). **Der biochemische Typus der Pflanzen und die Diagnose der Krankheit. (Kalkchlorose bei der Weinrebe).** [The biochemical type of plants and the diagnosis of the disease. (Lime-induced chlorosis in the Vine).]—*Planta*, 35, 5–6, pp. 701–749, 21 graphs, 1948.

Approaching the problem of lime-induced chlorosis in plants from the biochemical angle [*R.A.M.*, 28, p. 525], the author reaches the following conclusions on the basis of his intensive studies on vine leaves, which are fully described and tabulated. The disease is typically a metabolic one, being expressed principally in an increase of the salt content, a disturbance of the equilibrium between the uni- and bivalent cations, and the accumulation of substantial quantities of disintegration products of the proteins. These substances further affect the course of the physiological processes by poisoning the protoplasm, an accompaniment of which is the inhibition of chlorophyll formation, associated with chlorosis or even blanching of the foliage. The peculiar structure of the chlorotic leaves may be explained by the distribution of the toxins therein. The first part to turn yellow is the intervenal parenchyma at the tip or along the margins, while the veins themselves and their vascular bundles remain green. The ascending stream, carrying the toxins, travels from the leaf base to the tip and the margins. The water evaporates and the dissolved toxins are left in the cells, where they interfere with the normal physiological functions so as to preclude chlorophyll production. The weak solution in the vascular bundles is not sufficiently powerful to poison the contiguous cells, where chlorophyll formation is consequently unimpeded and the normal green coloration develops.

Urquijo Landaluze (P.). **La 'antracnosis' de la Vid en Galicia.** [Vine anthracnose in Galicia.]—*Bol. Pat. veg. Ent. agríc., Madr.*, 15, pp. 109–116, 3 figs., 1947. [Received January, 1950.]

In 1934 the first samples of vines infected by *Elsinoe ampelina* in Galicia were received at the Coruña Agricultural Experiment Station, and in succeeding years further material from the same province was submitted for examination. This was the first record of its actual presence in Spain [*R.A.M.*, 15, p. 75]. The available information on its symptomatology, on climatic and varietal factors in relation to its development [ibid., 24, p. 490], and control is summarized.

Refatti (E.). **Attacchi di 'antracnosi della Vite' nella 'piana Perginese' (Trento).** [Attacks of 'anthracnose of the Vine' in the 'plain of Pergine' (Trento).]—*Notiz. Malatt. Piante, 1949*, 2, pp. 34–36, 1949. [Mimeographed.]

In the spring of 1944 in the plain of Pergine, Italy, replanted with vines in 1930, the first outbreak of anthracnose (*Elsinoe ampelina*) [*R.A.M.*, 14, p. 616; 23, p. 375; 24, p. 490; 28, p. 49] occurred on Seibel 1000 growing in the lowest part of the plain. In 1945, 1946, and 1947 the disease appeared in other vineyards and the effect on production was rather serious. In 1948, a very wet year, infection was general over the whole area. All the Seibel 1000 vines were attacked except those on the hill slopes, crop losses ranging from 10 to 100 per cent., but the damage sustained varied with the cultural practices followed; vines grown on a pergola, for example, were much less affected than others, while badly pruned vines developed severe infection. Other non-grafted hybrids on hill slopes were also unaffected. Vines grafted on American stocks were less susceptible than ungrafted vines. In preliminary fungicide tests disease incidence on vines sprayed on 18th April, 1949, with 13 per cent. calcium polysulphide was markedly reduced by 16th May. Continuous rain from the middle of April to the end of May had provided optimum conditions for

infection. On 17th May and a fortnight later all the vines were sprayed with Bordeaux mixture (4–4–100); infection was almost completely arrested. Later the disease was reported on Seibel 1000 in the Tione area (Trento).

Twenty-second Annual Report of the Commonwealth Council for Scientific and Industrial Research for the year ended 30th June, 1948.—141 pp. [? 1949].

This report [cf. *R.A.M.*, 28, p. 52] contains the following items of phytopathological interest. Progress is being made in breeding new potato lines, which combine good agronomic properties with disease resistance [ibid., 29, pp. 48, 49]. Twelve hybrids have been developed which are immune from virus X, field immune from virus A and nearly so from virus Y, highly resistant to leaf roll, and possess good commercial qualities. Leaf roll resistance is best developed by selecting from hybrid progenies sensitive seedlings, which are more resistant than tolerant ones and can be easily rogued as symptoms are never masked. In extended field experiments in which 15 potato varieties were tested for resistance to common scab (*Actinomyces scabies*) in comparison with Late Carman, the recent introductions Ontario and Cayuga [ibid., 26, p. 77] were most resistant, while the Canadian seedling 1537-12 also showed much promise. The order of susceptibility varied in different localities: for example, King Edward was highly resistant at Canberra, but very susceptible in Tasmania. No variety was immune. Twenty-one cultures of *Actinomyces* from various parts of Australia fell into three groups in their reactions on Katahdin potatoes, severe, moderate, and very slight. There was a definite but incomplete correlation between pathogenicity and a dark discoloration produced in skim milk and nutrient broth. In a further test for resistance to *Rhizoctonia* [*Corticium*] *solani* [ibid., 29, p. 129], Brownell, Smooth Rural, Potomac, and S-2 were among the least affected potato varieties, while Warba, Red Warba, Russet Burbank, and Arran Banner were among the most susceptible. During the period under review no [tomato] spotted wilt was observed on potato plants [ibid., 28, p. 588], probably owing to low thrips [*Thrips tabaci*] population.

Tomato hybrids field immune from *Fusarium bulbigenum* var. *lycopersici* [ibid., 29, pp. 84, 87] have been distributed to the State Departments of Agriculture for selection and further development. Investigations on early blight (*Alternaria solani*) of tomatoes [ibid., 28, p. 255] showed that various isolates differed pathogenically. None of the many varieties and lines tested has shown complete immunity from the disease. Bounty×*Lycopersicon pimpinellifolium* hybrids, more resistant than Pearl Harbor under greenhouse conditions, are now ready for field trials. The effect of triple planting [ibid., 25, p. 188] on incidence of spotted wilt was studied at Dickson Experiment Station. In one experiment the triple planted plots were surrounded by a zone of tick beans kept sprayed with DDT to act as a trap for thrips. The incidence of spotted wilt was light and at thinning time the disease was completely eliminated; apparently the border of tick beans was a good protectant.

Much progress has been made in breeding pea varieties resistant to *Ascochyta pisi*. The highly resistant Austrian Winter has been interbred with commercial varieties. No variety with high resistance to *Mycosphaerella pinodes* or *A. pinodella* has yet been found. One variety was highly resistant to powdery mildew (*Erysiphe polygoni*) [ibid., 26, p. 2], but all (Greenfeast less than others) were susceptible to bacterial blight (*Pseudomonas pisi*) [ibid., 27, p. 591].

Of many varieties of bush and pole bean [*Phaseolus vulgaris*] examined for resistance to halo blight (*Pseudomonas medicaginis* var. [f.sp.] *phaseolicola* [ibid., 28, p. 151]) and *Xanthomonas phaseoli* [ibid., 27, p. 591], some strains of Red Mexican were highly resistant to the former, and two varieties to the latter disease.

Although the inheritance of resistance to lucerne rust [*Uromyces striatus*: ibid., 28, p. 442] is genetically complex, work over the past ten years has disclosed strains

which are 100 per cent. resistant, though commerically undesirable. Further breeding work to improve this material will continue at the New South Wales Department of Agriculture. A survey of lucerne-growing areas in the Lachlan Valley indicated that the incidence of witches' broom [virus: ibid., 14, p. 516] reaches a maximum in summer and a minimum in winter. Only graft transmissions were successful in inoculation experiments. Further studies are in progress.

In the section dealing with forest products investigations (pp. 46–58) it is stated that the wood of eucalyptus timbers can now be treated satisfactorily with creosote oil [ibid., 28, p. 53] at pressures of 1,000 lb. per sq. in. Average absorptions of over 6 lb. per cu. ft. have been obtained.

Plant diseases and insect pests. Notes by the Biological Branch.—*J. Dep. Agric. Vict.*, 48, 2, pp. 87–91, 94, 4 figs., 1950.

A description is given of symptoms and control of wilt-inducing, soil-inhabiting fungi, which frequently attack ornamental plants in Victoria. *Fusarium* spp. affect aster [*R.A.M.*, 28, p. 470], *Zinnia*, *Rudbeckia*, sweet pea, *Gerbera*, and carnation; *Verticillium* spp. attack snapdragon [*Antirrhinum majus*] and sweet pea, and *Sclerotinia sclerotiorum* [ibid., 28, p. 533] *Dahlia*, sunflower, and *Zinnia*. The control measures include soil sterilization with formalin, watering with Cheshunt mixture, seed disinfection with copper carbonate, copper oxychloride, or an organic mercury dust, and sanitation and crop rotation. Bordeaux mixture (4–4–50) applied to the base of the plant and the ground during the cold, wet period controls *S. sclerotiorum* effectively.

Hollyhock rust (*Puccinia malvacearum*) [ibid., 27, p. 115] can be combated by good sanitation, frequent sulphur dustings, or spraying with liquid lime-sulphur (1 in 60 to 1 in 100) from spring to summer, or with home-made 3–4–40 Bordeaux mixture several times during the season.

Dyer (R. A.). **Plant pathology problems in the Union.**—*Fmg S. Afr.*, 24, 285, pp. 586–588, 599, 1949.

In this survey, part of the annual report for the year ended 31st August, 1949, of the Department of Agriculture, Pretoria [cf. *R.A.M.*, 28, p. 511], it is stated that confirmation has now been obtained in South Africa of the excellent control of citrus black spot (*Phoma* [*Guignardia*] *citricarpa*) [ibid., 29, p. 98] given by Bordeaux mixture (2–1–80). The same treatment also controls melanose (*Phomopsis* [*Diaporthe*] *citri*) [ibid., 21, p. 46; 29, p. 98]. It has been established that stem-pitting of grapefruit [ibid., 29, p. 23] can be spread by *Aphis tavaresi*. The disorder may be related to that causing die-back of limes in West Africa [ibid., 26, p. 287; 28, p. 162]. Limes infected by aphids from pitted grapefruit developed stunting, leaf flecking, corky veins, and pitting. Stem-pitting was also found on Bailidge Early sweet orange, the identity of the two conditions being proved by transmission test to grapefruit seedlings. Of 500,000 citrus trees, mostly in the Eastern Transvaal, inspected for psorosis, 55 were affected.

Three years' experiments on maize streak [virus: ibid., 27, p. 351] have shown that the resistance and yield of the commercial white maize varieties can be greatly enhanced by crossing with Barberton Hickory. Preliminary experiments showed that a 10-yd. stretch of fallow round susceptible maize plants was much more effective in keeping out streak than planting sunflowers, cowpeas, or resistant Peruvian maize in a similar strip. A new stalk and crown rot of maize, caused by *Helminthosporium carbonum* [ibid., 26, pp. 288, 448], was severe in the Nyl region of the Springbok flats. The fungus was strongly pathogenic to maize roots and leaves and attacks were associated with severe phosphate deficiency. The disease was also present sporadically in the eastern Transvaal near Lydenburg.

Race 34 of *Puccinia graminis* was again the only one found on wheat round

Pretoria [ibid., 28, p. 511]. Numerous imported wheat varieties were tested in the seedling stage against race 34, and the highest resistance was displayed by Epipeas from Portugal, and Chianga 2,570 from Mozambique; Yalta from Australia and Kentucky selection 4097-37 from the United States were highly resistant.

Two potato varieties are approaching general release. Seedling no. 914 a (12) [ibid., 27, p. 579] from Scotland, under the serial number 134, is being multiplied at Riet River and George. It is resistant to blight [*Phytophthora infestans*: cf. ibid., 27, p. 351] and so far has withstood all blight attacks in the field. Virus-free seed of Kennebec [ibid., 28, p. 139] is being produced at Riet River. No new outbreaks of potato wart [*Synchytrium endobioticum*: ibid., 28, p. 511] were recorded.

It is considered that tomato bacterial canker (*Corynebacterium michiganense*) [ibid., 29, p. 128] is too widespread in the Transvaal to be eradicated. There were eight new records of vine blight [*Erwinia vitivora*: ibid., 28, pp. 158, 511; 29, p. 137] during the year, six being from the Paarl district and two in the Worcester area.

The following items of interest occur in other parts of the report. J. S. Marais (pp. 589–593, 599) reports that in studies of wheat take-all [*Ophiobolus graminis*: ibid., 24, p. 402; 28, p. 281] at the Stellenbosch-Elsenburg College of Agriculture the hybrids wheat × rye and wheat × *Agropyron*, produced by the plant breeding section, and all possible parents are being tested for resistance by severely infecting the media in which they are grown. Any plants showing resistance are used on a large scale as parents. After 13 months in the soil 10 per cent. of the spores of *O. graminis* remained germinable. Other aspects of the problem are being investigated.

R. I. Nel (pp. 594–599) dealing with orchard and vineyard diseases stated that pruning away the wood of peach trees affected by mildew (*Oidium leucoconium*) [*Sphaerotheca pannosa* var. *persicae*: ibid., 25, p. 265] tends to increase infection, because of the many young, susceptible leaves which then develop. Satisfactory control of peach leaf curl (*Taphrina deformans*) [ibid., 23, p. 251; 28, pp. 406, 446] followed a dormant treatment with lime-sulphur (1–14); dinitro *o*-cresol (2 lb. per 100 gals.), though less effective, may, when used as a spray against delayed foliation, be sufficiently effective against leaf curl to replace the winter spray of lime-sulphur or copper.

Of 730 vine seedlings tested 17 displayed marked resistance to inoculation with *Erwinia vitivora*. In a preliminary investigation of a silver leaf condition of stone fruits present all over the Western Province, an unidentified bacterium was the only organism consistently isolated from discoloured portions of the trunk and limbs. Gummosis of apricots is fairly widespread and was found on apricots, peaches, and cherries at Paarl, Fransch Hoek, Wellington, Tulbagh, Ceres, Ladismith, and Montagu. Zinc ethylene bisdithiocarbamate [ibid., 27, pp. 39, 566: 28, p. 344] gave good control of pear scab (*Venturia pirina*) with less fruit injury than was caused by the sprays generally used. A leathery rot of strawberry fruits due to a species of *Phytophthora* and resembling that attributed to *P. cactorum* [ibid., 27, p. 374] in the United States, caused much damage near Villiersdorp. Daffodil [*Narcissus pseudo-narcissus*] root rot (*Cylindrocarpon radicicola*) [ibid., 14, p. 366] was present on the Cape Flats.

Progress Report, Dominion Experimental Station, Morden, Manitoba, 1938–1947. —87 pp., 24 figs., 1 map, 1949.

Since the summer of 1944 the incidence of fireblight (*Erwinia amylovora*) [*R.A.M.*, 28, p. 442] on apples and pears in Manitoba has been light. At the Morden Experiment Station the pear varieties Harbin, Liaogang, Minnesota strain 4, Pioneer strain 3, and Ussurian, Green Sweet apples, and Bedford, Florence, and Printosh crab apples were markedly resistant, while Bantam and Trait-Dropmore pears, Manitoba, Mendel, Morden Russet, Patten Greening, Pedro, and Petrel apples, and Alexis, Almey, Anis, Beauty, Crimson Beauty, Hopa, M347, M352, *Malus mand-*

shurica, Redman, Robin, and Lundog crab apples appeared to be resistant [cf. ibid., 25, p. 206; 27, p. 139; 28, p. 442].

A promising phase of the vegetable breeding work is the use of first generation hybrids. The bush tomatoes Bounty × Redskin, Early Chatham × Bounty, and Early Chatham × Firesteel have significantly outyielded the standard sorts and their hybrid vigour appears to promote resistance to leaf spot diseases, such as *Septoria* [*lycopersici*] and *Alternaria* [*solani*], which are sometimes serious in Manitoba. Drought resistance, as shown by the absence of blossom-end rot in a season when it was prevalent, was also noted in the hybrids.

A list is given of 38 species of plants resistant to lime-induced iron chlorosis in alkaline prairie soils.

In tests during the period 1942 to 1946 the hybrid maize varieties Wisconsin 240, Falconer (the standard local variety), Wisconsin 255, Wisconsin 275, Kingscrost KE 1, and Kingscrost KE 3 (the last-named tested in 1942, 1945, and 1946 only) showed, respectively, an average of 5·1, 8, 4·3, 6·6, 7, and 4·2 per cent. smut [*Ustilago maydis*: ibid., 28, pp. 282, 453; 29, p. 19]. In 1944 a breeding programme designed to improve sunflower varieties was begun, particularly with respect to resistance to diseases, which are becoming increasingly important as the crop is grown more intensively. The chief sunflower diseases in Manitoba are *Sclerotinia* wilt [*S. sclerotiorum*: ibid., 4, p. 95; 26, p. 61; 28, p. 533], which usually kills infected plants shortly after flowering, rust [*Puccinia helianthi*: ibid., 28, p. 106], and *Septoria* leaf spot [*S. helianthi*: ibid., 28, p. 401]. Several kinds of sunflowers show resistance to these diseases, but none is immune. The most practical means of control at present is to destroy all dead parts in the autumn; at least three years should elapse before another sunflower crop is grown on the same soil.

The Regent wheat variety in Manitoba is more susceptible to leaf [brown] rust [*P. triticina*: ibid., 22, p. 199; 24, p. 495; 29, p. 80] and root rot [chiefly *Helminthosporium sativum* and *Fusarium culmorum*] than Redman, but is semi-resistant to loose smut [*U. tritici*: ibid., 22, p. 162] and bunt [*Tilletia caries* and *T. foetida*: ibid., 23, p. 249]. During the period under review all oat varieties susceptible to stem rust or to crown rust [*P. graminis avenae* and *P. coronata*, respectively] have been replaced [in Manitoba] by resistant varieties. The Royal variety of flax [ibid., 27, p. 554; 28, p. 562] is susceptible to pasmo disease [*Sphaerella linorum*: ibid., 29, p. 212], but semi-resistant to rust [*Melampsora lini*: 29, p. 213] and wilt [*Fusarium lini*: loc. cit.].

Leach (E. W.). **Trinidad and Tobago Administration Report of the Director of Agriculture for the year 1948.**—28 pp., 1950.

In this report [cf. *R.A.M.*, 28, p. 162] it is stated that in Trinidad the planting of sunn-hemp [*Crotalaria juncea*] between rows of citrus stocks reduces scab [*Elsinoe fawcetti*: ibid., 21, p. 281]. When ammonium sulphate was applied to grapefruit trees showing many deficiency symptoms, including die-back [cf. ibid., 24, p. 366; 27, p. 520], most of the trouble disappeared and yield was greatly increased. Zinc and manganese removed any persisting leaf symptoms and zinc the die-back, but neither had any appreciable effect on yield. Magnesium sulphate markedly reduced the crop when applied in addition to ammonium sulphate.

The dying-out of limes [ibid., 28, p. 163] still continues. Manures and minor elements may give temporary improvement, but in some cases they appear to hasten the process. Land on which citrus has been grown for some time appears to favour the condition, one such field having been found where seedlings die in a few months.

Science for the Farmer.—*Rep. Pa agric. Exp. Sta., 1948–9* (*Bull.* 515), 66 pp., 23 figs., 1 graph, 1949.

In this report [cf. *R.A.M.*, 27, p. 175] H. R. Albrecht and K. W. Krietlow

state that it appears to be possible to isolate lines of clover resistant to *Fusarium* root rot [ibid., 8, p. 176; 10, p. 670; 21, p. 527; 26, p. 110], one of the most serious diseases affecting clover stands in Pennsylvania. C. C. WERNHAM has obtained more than 200 lines of maize possessing marked resistance to blight [*Helminthosporium turcicum*: ibid., 29, p. 19] and smut [*Ustilago maydis*: see preceding page]; the progeny from over 75 per cent. of these lines, rated 1 or 2 in 1947 (in a 1 to 5 scale of ascending susceptibility), rated the same in 1948.

J. W. SINDEN found that when manure for mushroom growing is protected from rain, which causes anaerobic decomposition, it composts slowly and becomes fit for use after about one month. Provided the pile is kept narrow enough to prevent anaerobiosis the manure will require only wetting subsequently and to be left four to six days to heat thoroughly. Soils of high magnesium content, if used for casing mushroom beds [cf. ibid., 29, p. 195], delay production of the crop and may halve the total yields. The use of lime containing a high magnesium content for adjusting the acidity of casing soil should be confined to soils naturally low in magnesium. Bubble (*Mycogone* [*perniciosa*: ibid., 22, p. 160; 28, pp. 112, 268]), spot (*Verticillium* [*malthousei*: ibid., 22, p. 160; 28, p. 2]), and mildew (*Dactylium* [spp., including *D. dendroides*: ibid., 22, p. 160; 27, p. 552; 28, p. 112]) may be controlled by spraying the beds with 1 lb. parzate or dithane Z 78 per 100 gals. water. About one pint should be applied to each 10 sq. ft. of surface when the beds are first watered after casing, and again between the breaks; this has controlled these diseases effectively in several mines and in standard mushroom houses, but is not recommended as a substitute for soil treatment with cold formaldehyde. The spray may be applied safely while mushrooms are on the beds.

O. E. STREET and E. O. SCHNEIDER have developed methods which permit the production of healthy tobacco seedlings with good root systems. A commercial preparation of urea containing 43 per cent. nitrogen, applied as a 'foliar' fertilizer at rates up to 25 lb. per acre, effectively and safely stimulated growth. Complete control of wildfire [*Pseudomonas tabacum*: ibid., 28, pp. 228, 424] was given by three applications of Bordeaux mixture (4–2–50), at intervals of 10 to 14 days starting before emergence, at 10·5 down to 8·6 gals. per 100 sq. yds. of seed-bed. Blue mould [*Peronospora tabacina*: ibid., 29, pp. 124, 203] was controlled by various materials, though 50 to 85 per cent. infection developed in untreated beds. Oxyquinoline benzoate was effective when used alone, but allowed infection to develop in areas where zinc or copper sulphate had been applied. Zinc was highly toxic, iron less so, and copper slightly.

In 1948 W. S. BEACH again found that the most effective control of tomato blight [*Phytophthora infestans*] and anthracnose [*Colletotrichum phomoides*] was obtained when zerlate was applied in the first three sprays [ibid., 28, pp. 36, 445, 599; 29, p. 63]; fixed copper was used in the fourth, fifth, and later sprays if these were necessary. A tank mixture of zerlate and tribasic copper sulphate proved to be compatible and gave as good control as the best sprays. Dithane Z 78 gave the best yield of saleable fruit by a small margin. Zerlate and parzate were less effective against early blight [*Alternaria solani*: loc. cit.] than Z 78.

Rapport annuel pour l'exercice 1948. [Annual report for the year 1948.]—*Publ. Inst. nat. Étude agron. Congo belge 1949* (hors sér.), 290 pp., 1949.

The following items occur in the sections of this report (pp. 63–80, 92–94) dealing with phytopathological work in the Belgian Congo [cf. *R.A.M.*, 28, p. 271]. In the control of *Hevea* root rots at Yangambi, clearing land by burning the vegetation increased the virulence of *Rigidoporus microporus* [*Fomes lignosus*: ibid., 29, p. 236]. For *Armillaria mellea* [loc. cit.] on both *Hevea* and oil palms this treatment should be rigorously carried out. The grave danger of *Diplodia* gummosis [*D. natalensis*] to citrons, which threatened during 1947, has been averted. The symptoms of

mineral deficiency exhibited by mandarins are also on the decline, but an attack by *Phytophthora citrophthora* has been reported on this host. A disease very similar to patch canker of *Hevea* [? *Phytophthora* sp.: ibid., 21, p. 323] has been observed on avocado. The only diseases of economic importance during the year were [bean] anthracnose (*Colletotrichum lindemuthianum*) and damping-off of seedlings caused by *Rhizoctonia* [*Corticium*] *solani*.

The Forestry Division at Yangambi reports the following diseases: *A. mellea*, causing a characteristic root rot of *Baikieia* sp. and *Hymenocardia acida*; *F. lignosus* on *Pterocarpus soyauxii*, *Fagara melanorachis*, and *Aleurites montana*; *Rosellinia bunodes* on *Phyllanthus* sp.; *Phellinus* [*Fomes*] *nigricans* and *F. ferruginosus* both causing root rot of *Entandrophragma* sp.; *Fusarium tumidum*, causing tracheomycosis of *Xylopia*, and an apparently new root rot on *Lovoa trichilioides*.

Light exerts a marked inhibitory effect on the mycelium of *A. mellea* but has less effect on *Fomes lignosus* since the hyphae are shorter and thicker; they form a parenchymatous stroma more rapidly in the light than in darkness. Preliminary observations have shown that in both the light and the dark the most rapid growth and stromatic development in *F. lignosus* were obtained on synthetic media at pH 5·5 to 7·7 (optimum 6·5), and in *A. mellea* from 3·5 to 5·5 (optimum 4). It was established that *A. mellea* can attack young oil palms (*Elaeis guineensis*) before they are planted out.

In an investigation of fusariosis of oil palms, *Fusarium oxysporum* was maintained in pure culture by means of frequent transfers to fresh media. In liquid media adjusted to pH 5 the organism grew slowly and the mycelium became pinky-orange but the organism did not colour the medium. The *Hevea* Division reports that copper sulphate sprays have been replaced by 2 per cent. copper solution for the control of *Fomes* root rot of *Hevea* [*F. lignosus* and ? *F. noxius*]. In order to observe the development of root rots in a planting established several years after clearing the land, hygienic control was practised in *Hevea* planted in 1942 in a coffee plantation established in 1934. The first results [in 1948] were as follows: 87·5 per cent. healthy trees, 1·13 attacked by *Fomes*, 2·05 by *A. mellea*, 8·91 slightly affected by *Fomes*, and 0·41 per cent. removed as a result of *Fomes* attack. An examination for the presence of *Fomes* on the site of the 1936–40 experiments showed that in spite of the lapse of time since the land was cleared in 1935, there were 39·6 per cent. trees dead, 19·9 per cent. being killed by root rot.

It is reported from Keyberg that uredospores of *Puccinia pruni-spinosae* damaged young leaves of peach trees severely. Stem cankers, which were observed on both young and old trees, appear in the dry season on branches exposed to the sun, at first as cracks in the bark, then as wounds and finally, after a few years, as enormous cankers extending the whole length of the branch. Drastic pruning of the dead areas appeared to give excellent control in an old orchard. Slight attacks of *Schizophyllum commune* were observed on some branches of apple trees.

Good results were obtained in the control of citrus scab (*Sphaceloma* [*Elsinoe*] *fawcetti*), which is endemic in the nurseries, by repeated preventive treatments with concentrated Bordeaux mixture. Rough lemon shows satisfactory resistance to the disease.

A species of *Nematospora* was isolated from young fruits of *Persea drymifolia* with brown depressions and poor development. The symptoms were less serious on older fruit.

A curative spray with potassium permanganate combined with a preventive sulphur treatment limited the damage to vines caused by *Uncinula necator*.

A treatment, at present under observation, appears to influence the effect of

mixed or separate applications of phosphate ('Reno' hypophosphate) and boron on needle fusion in pines [cf. ibid., 25, p. 373].

Rust, caused by *Kuehneola gossypii* [*Phakopsora desmium*], was observed on cotton leaves at Lubarika.

De Ropp (R. S.). **The experimental inhibition of the growth of plant tumors.**—Abs. in *Amer. J. Bot.*, 36, 10, p. 823, 1949.

In experiments at the New York Botanical Garden various compounds were tested for inhibitory action on the growth of crown gall bacteria [*Bacterium tumefaciens*: *R.A.M.*, 29, p. 146] on fragments of chrysanthemum stems, when applied three days after inoculation. A concentration of 1 mg. per l. folic acid analogues reduced growth, but high concentrations increased it. Nine out of 11 nitrogen mustards at 10 mg. per l. inhibited tumour growth.

Nicol (J.), Owen (H.), & Strickland (A. H.). **Biological control of the mealybug vectors of swollen shoot virus of Cacao.**—*Nature, Lond.*, 165, 4195, p. 490, 1950.

In experiments at the West African Cacao Research Institute, when adults of *Pseudococcus njalensis* [*R.A.M.*, 28, p. 211] were rolled in sporulating cultures of two strains of *Aspergillus parasiticus* [ibid., 27, p. 132], ((1) NRRL 465 and (2) NRRL 502), 88 per cent. were dead after 120 hours compared with 11 per cent. of the untreated. In further experiments a dust containing about 12,000 spores in 0·25 gm. talc was applied to four batches of 25 mealybugs each in 7·5 cm. diameter Petri dishes. The dust was blown upwards into a tower 25 cm. in diameter at 20 lb. per sq. in. pressure and allowed three minutes to settle on the four dishes on the floor. The experiment was repeated after the dusts had been stored in corked tubes for ten weeks. *A. flavus* and *A. niger* were also applied. The corrected percentage deaths after 96 hours with *A. parasiticus* (1) were 96 for fresh dust and 97 stored; *A. parasiticus* (2) 90 and 97, respectively; *A. flavus* 7 and 20; *A. niger* 2 and 6; talc alone —1 and 0; and no treatment 0 and 0.

Thomas (I.) & Cariss (H. G.). **Pedigree seed production.**—*J. Dep. Agric. W. Aust.*, Ser. 2, 26, 3, pp. 215–226, 1 fig., 4 diags., 1949.

Short descriptions are given of recommended varieties of wheat [*R.A.M.*, 29, p. 15], oats, and barley at present being produced as pedigree seed in Western Australia. Among the recommended wheat varieties not previously noted is Kondut (early), which is resistant to flag smut [*Urocystis tritici*], and although not resistant to rust [*Puccinia graminis*], yields well under epidemic conditions.

Von Hofsten (C. G.). **Det brister i utsädesbetningen. Några reflexioner med anledning av årets rikliga sötforekomst.** [Seed treatment has been neglected. Some reflections suggested by the year's abundance of smut.]—*Landtmannen, Uppsala*, 33, 46, pp. 866–868, 6 figs., 1949.

The exceptional prevalence of cereal smuts in Sweden in 1949 is attributed to negligence in seed treatment or its complete omission. Fields were visited just before harvest in which the incidence of wheat bunt (*Tilletia tritici*) [*T. caries*] reached 30 to 40 per cent. (70 to 80 in one stand), and when facing the wind the fishy odour [trimethylamine] associated with the disease [*R.A.M.*, 29, p. 92] was perceptible at a distance of 100 to 200 m. Cases are cited of heavy smut infection even in crops raised from ostensibly certified seed [see next abstract].

Fajersson (F.). **Stinksotangrepp och växtmiljö.** [Bunt infection and environment.] —*Lantmannen, Uppsala*, 33, 50, p. 955, 1949.

In 1949 wheat bunt [*Tilletia caries*] was prevalent on certain farms in East Gothland, Sweden, and absent on others. At a branch of the Weibullsholm

Plant Breeding Institute in the Linköping district, where varietal experiments were in progress and all the seed had been treated under controlled conditions by approved methods [see preceding abstract], every plot was infected. These observations are interpreted as evidence of the implication of environmental factors in the etiology of the disease, but C. G. von Hofsten (pp. 955, 960), commenting on this suggestion, attributes the foregoing case to soil infection. He also states, in connexion with the hot-water treatment for loose smut control, that the old-fashioned method of 20 dips at 55° C. for wheat [*Ustilago tritici*] and at 50° for barley [*U. nuda*] is unsuitable for entire sacks. At the Plant Protection Institute, Stockholm, more dependable results have been given by two hours' immersion at 47° or by the passage of the seed in a thin layer on a conveyor belt through a bath held at a temperature of 55° or 50°, respectively [cf. *R.A.M.*, 29, p. 254].

Holton (C. S.), Bamberg (R. H.), & Woodward (R. W.). **Progress in the study of dwarf bunt of winter Wheat in the Pacific Northwest.**—*Phytopathology*, 39, 12, pp. 986–1000, 3 figs., 1949.

This is a report on the progress of the studies on dwarf bunt of winter wheat (*Tilletia caries*) in the Pacific Northwest initiated in 1942 [*R.A.M.*, 28, p. 450]. The disease can seldom be reproduced artificially by seed inoculation, only one experiment having given positive results over a 15-year period. The infective material persists in the soil for two years or more, as demonstrated by its occurrence in commercial wheat fields and by controlled experiments. The pathogen flourishes in a wide range of climatic conditions and soil types, especially in dry-land areas and compact soils. The height of infected plants is only one-third to one-half that of healthy ones, according to the variety. Among the six varieties measured, the degree of dwarfing reached a maximum in Turkey and was least in Triplet; Cache, Tenmarq, Utah Kanred, and Minhardi were intermediate in reaction.

No evidence is forthcoming for the existence in the Pacific Northwest of pathogenically specialized races of dwarf bunt, but specialized entities were recognized on the basis of chlamydospore germination, spore size, prominence of spore wall reticulation, number of primary sporidia produced, promycelial branching, and host morphology.

A high degree of resistance to dwarf bunt is exhibited only by varieties carrying the Martin-Hussar gene complex, represented in these tests by selections from Ridit × Relief, Rex × Rio, Rex × Oro, Rio × Rex, Yogo × Wasatch, Martin × Tenmarq, Turkey C. I. 11530 × Oro, Brevon × Relief, Brevon × Wasatch, and Hussar × Kanred. The Ridit type of bunt resistance, exemplified in Brevon × Carlson's Fife, Ridit × Utah Kanred, and Composite Cross, confers a moderate degree of protection from dwarf bunt, while hybrids with the Turkey factor (TT), e.g., Alicel × Oro and Rio × Alicel, are highly susceptible. Plant-breeders have been extremely successful in the development of agronomically acceptable wheats with resistance to dwarf bunt. Resistant commercial wheats in production in the Pacific Northwest include Relief, Wasatch, Cache, Hymar, and Rex, and some of the many hybrid selections, with dwarf bunt resistance now available for breeding stock, show promise as potential new varieties. The cultivation of resistant varieties, the sole method of combating dwarf bunt, has been effectively practised in Utah, southern Idaho, western Montana, and central Washington.

Thompson (W. P.). **Some problems in the cytogenetics of cereals: a historical review.**—*Trans. roy. Soc. Can.*, Ser. III, Sect. V, 43, pp. 35–44, 1949.

The author reviews the work on the genetics of resistance in wheat to stem rust [*Puccinia graminis*] in Canada and the way in which the genetic effects of hybrid sterility were overcome.

Naoumova (Mme N. A.). К вопросу экологической оценки поражаемости Пшениц бурой ржавчиной. [On the problem of ecological evaluation of brown rust infection in Wheats.]—*Trav. Soc. Nat. Leningr.*, 34, 6, pp. 618–628, 6 graphs, 1949.

In field experiments started in 1937 at the Voroshilov Experiment Station in the Ordzhonikidzev district, various wheat varieties were inoculated at three stages of development with uredospore suspensions of brown rust [*Puccinia triticina*: *R.A.M.*, 27, p. 11] races 20 and 65, which are the most common ones in this area. The varieties were selected mainly for their ecological-geographical characters (steppe 'ecotypes'); their susceptibility to brown rust varied greatly. The results showed that the severity of infection corresponded at all stages of growth with the degree of susceptibility. The most resistant varieties were (in decreasing order) Gordeiforme 027, Melanopus 069, and Double Cross 1664 (a composite hybrid Markiz × Humanité, Markiz × Konrad). The two races did not differ in virulence, type of infection, or length of incubation period. In the soft, susceptible varieties Lutescens 062 and Erythrospermum 0341 the length of the incubation period, as shown by the expression of symptoms both at the base and the tip of the leaf, depended on the temperature [ibid., 15, p. 562] during all stages of growth. For the resistant varieties (Gordeiforme, Melanopus, and Double Cross) the period depended on temperature only during the germination stage. Later there was a considerable delay in symptom expression, especially in Melanopus 069; the uredosori of both races appeared four days later at the base than at the tip of the leaf. The results indicate that the length of the incubation period may be a factor to be considered in an ecological method for evaluating brown rust resistance in wheats, but further studies are necessary.

Noll (A.). **Studien über die Resistenz des Weizenblattes gegen Penicillium glaucum. Ein Beitrag zum Immunitätsproblem der Pflanze.** [Studies on the resistance of the Wheat leaf to *Penicillium glaucum*. A contribution to the immunity problem in plants.]—*Phytopath. Z.*, 15, 4, pp. 447–481, 5 figs., 8 diags., 1949.

With one exception, the author's inoculation experiments with *Penicillium 'glaucum'* on the leaves of Strubes Roter Schlanstedter summer wheat [cf. *R.A.M.*, 15, p. 640] at the Biological Institute, Brunswick, were successful only after wounding. It was further necessary to subject the leaves before inoculation to the so-called 'heat shock' by immersion for periods up to 50 seconds in water at 50° C. [cf. ibid., 24, p. 141], or to add to the inoculum of mycelial or spore suspensions the filtrate of a 10-day-old culture.

The following clearly differentiated zones developed successively in the infected tissue: the first necrotic, with the intercellular spaces more or less densely permeated by hyphae; the second narrower and almost or quite free from infection, impregnated with wound gum (gummosis); a third wider zone, remaining green and uninvaded by the fungus; and a fourth more extensive, chlorotic area, also fungus-free, the appearance of which is usually delayed. Histological study of the inoculated leaves is facilitated by the following treatment, previously applied in connexion with wheat rust (*Puccinia* spp.) experiments [loc. cit.]: 10 minutes' boiling in 50 per cent. potash lye, 20 minutes' immersion in a 1 per cent. solution of aniline blue (10 ml.) in glacial acetic acid (100 ml.), followed by rinsing until there is only a faint blue tinge on the leaves. The hyphae will then appear purple and the host tissue practically hyaline and transparent, except for the wound gum zone, which is of a vivid blue.

The development of gummosis in the infected tissues is attributed to the stimulus exerted by a special thermostable substance, designated agent A, which is extruded from the living or killed hyphae or spores and is able to penetrate even uninjured epidermal layers. This principle caused no appreciable damage to the tissues.

Similarly, the retention of the green colour in certain portions of the wounded tissues is ascribed to the influence of agent A. Necrotization of extensive tissue complexes could only be brought about by the application to the wound of an equally thermostable metabolic product, agent B, secreted by the fungus in the culture solution. Unlike A, B induced no gummosis. The growth of the fungus, restricted as it is to dead cells, is only possible by tissue necrosis. Thus, without the intervention of agent B the leaf, forming a gummous line of demarcation at the edge of the wound, remained resistant to *Penicillium 'glaucum.'* The enhancement of susceptibility induced by the preliminary heat treatment of the leaves was expressed by a regression of the gummosis and an advance of the necrosis and hyphal growth. The 'wound gum' proved to be a non-specific protective substance, arising as a result of stimulus by A and primarily directed against that principle; however, it also acted experimentally on B, inhibiting its diffusion and thereby preventing infection.

The histological conditions developing in wheat plants infected by *P. glaucum* present many analogies, which are discussed, with those consequent on rust attacks.

Schaller (C. W.). **Inheritance of resistance to loose smut, Ustilago nuda, in Barley.** —*Phytopathology*, 39, 12, pp. 959–978, 5 graphs, 1949.

This is a tabulated survey and discussion of studies at the Wisconsin Agricultural Experiment Station which resulted in the demonstration of four genes (three reported here for the first time) for resistance to loose smut of barley (*Ustilago nuda*) [*R.A.M.*, 21, p. 484]. Each of the four varieties analysed carried a single gene conferring its own degree of resistance to inoculation with the pathogen, the maximum being attained in crosses with Trebi [ibid., 26, p. 101] on Jet as one of the parents. The genes of these varieties were dominant in effect. The Dorsett and selection X173–10–5–6–1 genes permitted an incidence of about 13 and 43 per cent. smut, respectively, when homozygous, and 55 and 65 per cent., respectively, when heterozygous. The symbols Un_3, Un_4, and Un_5 are proposed for the genes in Jet, Dorsett, and selection X173–10–5–6–1, respectively.

The Trebi gene was independent of those residing in Jet and Dorsett, and there was also no connexion between the Dorsett gene and the weak one in selection X173–10–5–6–1. Linkage between the Dorsett and Jet genes was suggested, but the evidence was inconclusive. No associations were observed between the genes for resistance to *U. nuda* and the 'markers' (conditioning awn barbing, rachilla hair length, and lemma colour) for the several linkage groups [ibid., 26, p. 448].

Tapke (V. F.). **A mass-production method for studies of Barley smuts in the greenhouse.**—*Phytopathology*, 39, 12, pp. 1065–1066, 1949.

At the Plant Industry Station, Beltsville, Maryland, methods have been devised whereby 30,000 to over 60,000 barley plants can be grown annually during the winter months for smut (*Ustilago hordei*, *U. nuda*, and *U. nigra*) studies in a greenhouse bench area of 420 sq. ft. instead of 8,000 to 10,000 as formerly [*R.A.M.*, 29, p. 18]. To obviate the thinness and irregularity of the stands which often result from direct sowing in greenhouse benches, due to poor seed germination or smut infection of the emerging seedlings, H. A. Rodenhiser sowed the seed in soil in 4 in. by 8 in. tin pans, 2 in. deep. These are placed in covered tin boxes, usually containing moistened blotters, to check evaporation during germination, and the seedlings are transplanted to greenhouse benches at a height of about 1 in. This mode of germinating seed in controlled temperature chambers maintained at the optimum for infection is now in general use at the Station.

Another step towards a more economical utilization of greenhouse space consists in the substitution of small plants, with a single culm 12 to 18 in. high, for taller ones with numerous culms as indicators of smut reaction [ibid., 9, p. 170; 17, p.

738]. Barley plants of this size can be grown from spacing as close as 1 in. in rows only 4 in. apart, instead of 6 to 8 in. as previously used, and 100 per cent. infection has often been obtained under such conditions. Plant growth is further restricted by light watering two to three times weekly instead of daily. In one test 83 per cent. infection developed on susceptible varieties separated by 1 in. in rows only 2 in. apart.

On the basis of their studies on photoperiodicity (*Bot. Gaz.*, 110, pp. 103–118, 1948), Borthwick and his collaborators suggested to the author a further economy through the use of daily supplemental artificial lighting from 12 midnight to 2 a.m. instead of from 5 p.m. to 11 p.m. This practice has been adopted for two years with satisfactory results in respect of plant growth and smut incidence.

Anwar (A. A.). **Factors affecting the survival of Helminthosporium sativum and Fusarium lini in soil.**—*Phytopathology*, 39, 12, pp. 1005–1019, 2 figs., 1949.

The prevalence of *Fusarium lini* in the flax wilt nursery at University Farm, St. Paul, Minnesota, to which inoculum of the pathogen was added at intervals, was 3,000 spores or mycelial fragments per gm. soil, calculated as an average of the monthly counts, taken between 29th June, 1947 and 30th May, 1948 [cf. *R.A.M.*, 12, p. 221]. By contrast, the number of *Helminthosporium sativum* colonies in the barley plot receiving an annual dose of inoculum did not exceed 10 per gm. and the fungus was frequently irrecoverable from the soil [cf. ibid., 11, p. 169; 12, p. 785].

The population of soil micro-organisms and the flax wilt fungus varied with seasonal changes, reaching a maximum in September with 336,000,000 bacteria and Actinomycetes, 82,000 soil fungi, and 4,500 *F. lini* per gm. soil and October (300,000,000, 88,000, and 5,100, respectively), and falling to a minimum in January (41,000,000, 25,000, and 1,400) and February (19,000,000, 19,000, and 1,400, respectively). The fact that the population of *F. lini* followed the same trend as that of other micro-organisms indicates that the optimal conditions are the same in both cases.

Of a total of 86 isolates of bacteria, Actinomycetes, and fungi, 48 were antagonistic to *H. sativum* and 12 to *F. lini* in potato dextrose agar cultures. The metabolic products of some of the soil organisms, added to the culture medium, inhibited the growth of *H. sativum* but did not materially affect that of *F. lini*. A soil isolate of *Bacillus subtilis*, added to steamed soil with *H. sativum*, completely protected barley seedlings against root rot, while a reduction in the incidence of the disease was also effected by *Trichoderma lignorum* [*T. viride*: ibid., 12, p. 534], and *Penicillium* sp. *B. subtilis* further protected field plots of Barbless and Mars barley from heavy infection by *H. sativum*, which was also partially combated by the two fungi. Barley grown in rod rows infested with mixtures of *H. sativum* with one of three antibiotic micro-organisms outyielded that in the rows infested with *H. sativum* alone. Thus, the yields (in bush. per acre) of Barbless in the control, *H. sativum*+*B. subtilis*, *H. sativum*+*T. viride*, *H. sativum*+*P.* sp., and *H. sativum* plots were 21·4, 20·7, 16·1, 17·3, and 12·6, respectively, the corresponding figures for Mars being 22·4, 20·2, 17·9, 18·7, and 12·1, respectively. *F. lini* was not controlled by the antibiotic treatments either in moist or dry soils; the antagonistic action of *B. subtilis* towards *H. sativum* was somewhat more marked in the latter [cf. ibid., 28, p. 452].

H. sativum withstood six days' exposure to temperatures ranging from 45° to 50° C. both in steamed and natural soils, whereas *F. lini* rapidly succumbed at 35° to 37° in the former but survived fairly well in the latter at, but not beyond, that temperature.

The addition of infested barley stubble to the soil increased the incidence of root rot more than did that of infested soil, whereas in the case of flax wilt the position was reversed.

Grainger (J.) & Simpson (D. E.). **Electronic heating and control of seed-borne diseases.**—*Nature, Lond.*, 165, 4196, pp. 532–533, 2 graphs, 1950.

Preliminary experiments on the effect of dielectric heating were carried out on Star oat grain having 13 per cent. infection with leaf stripe (*Helminthosporium* [*Pyrenophora*] *avenae* [*R.A.M.*, 28, p. 520]. The oat grain was placed in a cardboard box with no metal parts between the electrodes of a standard *RH* 23 Redifon radio-frequency generator and maintained at the required temperature, usually for 20 minutes, and then spread out to cool. Heating at 60° C. for 20 minutes reduced leaf stripe by 50 per cent. without greatly affecting germination, although longer periods affected germination more than leaf stripe. The degree of control with radio-heating treatment is not considered adequate for practical application. Work is being carried out on loose smut [*Ustilago nuda*] of barley.

Biraghi (A.). **Reperti istologici su piante di Mais affette da 'nanismo'.** [Histological observations on Maize plants affected by 'dwarfing'.]—*Notiz. Malatt. Piante, 1949*, 7, pp. 1–3, 1949. [Mimeographed.]

Histological studies on maize plants in Italy affected by 'dwarfing' [*R.A.M.*, 29, p. 95] showed that in transverse sections of young roots the vessels were greatly enlarged in a radial direction; in place of the rays were large, irregular, mostly elongated cells with pitted walls. The phloem was abnormally arranged and the elements had irregularly thickened walls. There were marked irregularities in the arrangement and size of the vascular bundles of the stem. The phloem elements appeared to have proliferated actively. In some cases there was a slight increase in the volume of phloem tissue and sometimes wood vessels formed in it; in more severe cases numerous elongated cells arranged fanwise were present, bounded externally by cells with thickened walls, some of which were pitted and lignified. In this manner pathological formations developed which resembled the structure of certain neoplasms or of certain wound formations. The centre of these galls was often darkened as a result of necrosis of some of the elements. The vascular bundles of some leaf veins not infrequently displayed the same condition, in extreme cases visible externally as a suberose thickening of the vein several mm. long. The evidence suggests that the condition is of virus origin.

Orillo (F. T.). **Helminthosporium maydis Nisikao & Niyake : its parasitism and production of toxic metabolic by-products.**—Abs. in *Amer. J. Bot.*, 36, 10, p. 813, 1949.

Studies at the Harvard Biological Laboratories have shown that *Helminthosporium maydis* [*Cochliobolus heterostrophus*: *R.A.M.*, 29, p. 19] can infect the leaf sheaths of maize and also the husks of the ears as well as the leaf blade. In the greenhouse plants in inoculated soil developed root infections. Stems and midribs were infected only after wounding and subjection to high relative humidities. *Euchlaena mexicana* and *Rottboellia exaltata*, a common field weed, were markedly susceptible when inoculated.

A toxic substance produced by the fungus in Richards's solution caused chlorosis, especially of the younger leaves of maize seedlings, followed by curling of the leaf margins and wilt. On sugar-cane shoots a purplish discoloration of the leaves was followed by leaf-rolling and death of the whole shoot. The toxic substance was found to be slow acting and thermostable.

Le Beau (F. J.) & Coleman (O. H.). **The inheritance of resistance in Sorghum to leaf anthracnose.**—*Agron. J.*, 42, 1, pp. 33–34, 2 figs., 1950.

In crosses made at the Sugar Plant Field Station, Meridian, Mississippi, between two susceptible domestic varieties of sorghum, Collier and Leoti, and three recent African importations, MN778, MN822, and MN960, the F_1 plants of Collier×

MN960, Collier × MN822, and Leoti × MN822 were all resistant to artificial infection in the greenhouse and field by leaf anthracnose (*Colletotrichum graminicola*) [*R.A.M.*, 22, p. 475] (considered independently of the stalk rot phase of the disease), as were the MN822 and MN960 parents. The F_1 progeny of Collier × MN778, Leoti × MN778, and Leoti × Collier and its reciprocal were all susceptible. The colour reactions were brown for the F_1 Leoti × MN822 and Leoti × MN778 and purplish-red in the other hybrids.

F_2 and back-cross progenies were inoculated in the winter of 1948 9 and selected after about three weeks on the basis of reaction to leaf anthracnose and colour. They were classified in the following four phenotypes: resistant-purple LP, resistant-brown Lp, susceptible-purple lP, and susceptible-brown lp. The degree of agreement with the expected 3 : 1 ratio, the grouping interaction between families, and the linkage interaction between the two factor pairs Ll and Pp for the 31 families representing six F_2 and two back-cross progenies are shown in a table. Chi-square values substantiate monofactorial segregations. No linkage was apparent between plant colour and resistance to *C. graminicola*.

Tristeza disease of Citrus in Brazil.—*Calif. Citrogr.*, 35, 4, p. 135, 1950.

This is a summary, derived mainly from the introduction and discussion of a report by T. J. Grant, A. S. Costa, and S. Moreira, which is to be published fully in *Proc. Fla hort. Soc.* In a preliminary note F. E. Gardner points out that the period elapsing between inoculation of citrus plants with tristeza virus [*R.A.M.*, 29, p. 208] and the appearance of symptoms is very much shorter in Brazil than for quick-decline in California. Tests were carried out, therefore, at Campinas, Brazil, on numerous citrus varieties (as rootstocks, scions, and seedlings). The rootstocks fell into two groups, non-tolerant and tolerant. The former are considered unsatisfactory as stocks for sweet orange in the presence of tristeza and they include all sour oranges, grapefruits, shaddocks [*Citrus maxima*], and pomelos. Growers should avoid these in new plantings. The tolerant stocks which have not developed tristeza symptoms so far include all sweet oranges and mandarins. Sweet orange, therefore, appears to be a safe and satisfactory stock for sweet orange. The trifoliate orange [*Poncirus trifoliata*], used extensively in Uruguay [ibid., 27, p. 130] and Argentina, proved extremely satisfactory as rootstock for sweet orange, and showed no symptoms as scion on sour orange. The Caipira sweet orange also has proved a very satisfactory stock both for sweet orange and Marsh grapefruit. The Rangpur lime [ibid., 29, p. 208] is a good rootstock for sweet orange, but for grapefruit was somewhat susceptible to gummosis [*Phytophthora* spp.: ibid., 28, p. 213]. The Cleopatra mandarin is satisfactory and it is likely that some other mandarins and hybrids may prove good rootstocks. Since grapefruit, mandarin, and tangerine scions react in a manner similar to sweet orange, growers of these are advised to use the tolerant rootstocks recommended at the present state of knowledge.

Most of the true lemons tested were non-tolerant as rootstocks for sweet oranges, while limes on sour orange developed symptoms following inoculation. Some limes and lemons have shown symptoms when inoculated as seedlings. The behaviour of lemons as seedlings and scions on various rootstocks is still not clear. Eureka lemons on sour orange developed well under tristeza conditions, but in screenhouse tests some Eureka seedlings were infected. There is conflicting evidence as to the use of rough lemon as a rootstock in tristeza-infested areas. At Campinas the seedlings were generally tolerant of the virus. At Limeira the Brazilian type of rough lemon proved to be a better stock than the Florida type, but at Piracicaba the reverse was true. Hybrids between non-tolerant grapefruits and tolerant tangerines (tangelos) also fall into the non-tolerant and tolerant groupings. The same dual reaction may be possible in some rough lemon types. In order to safe-

guard growers who may wish to use rough lemon as rootstock, individual seed sources should be established and tested for their reactions to the virus.

Haas (A. R. C.). **Mineral-element deficiency or excess and tipburn in Citrus leaves.** —*Calif. Citrogr.*, 35, 5, pp. 184–185, 198–199, 5 figs., 1950.

The author describes and illustrates some differences in the manifestations of tipburn in citrus leaves when brought about by excess chlorine or boron, or sulphate in association with low nitrogen, and deficient phosphorus and potassium [*R.A.M.*, 29, p. 98] alone or together. In cases of excess the proximal edge of tipburn necrosis is usually at right-angles to the direction of the midrib or progresses most rapidly along the leaf margins, the area surrounding the midrib being the least subject to burn. When there is a deficiency tipburn advances most rapidly along the midrib.

Chowdhury (S.). **Foam disease of Citrus in Assam.**—*Curr. Sci.*, 19, 2, pp. 62–63, 2 figs., 1950.

Khasi orange trees (*Citrus reticulata*) over five years old in Assam recently suffered serious damage from a disease of unknown etiology called 'foam' or 'weeping disease' [*R.A.M.*, 8, p. 226; 9, p. 160]. Trees growing on the foot-hills and on poorly drained soils were especially susceptible. The characteristic symptom is the exudation of white foam or froth (consisting of a mass of yeast cells and fungus mycelium) from longitudinal cracks in the bark, usually at ground-level or about 1 ft. higher on the trunk. There may be one to many lesions and they are 1 to 12 cm. long and 3 to 10 mm. wide. The branches may be affected, but not as frequently as the trunk. The bark rots and the wood underneath turns slightly brown, emitting a disagreeable odour. The lesions, which facilitate the entry of insect borers and other destructive agents, increase gradually, finally resulting in the complete girdling of the trunk or branch. Fruit production is reduced and the life of the tree shortened. The symptoms appear in June with the rains and continue till September. With the onset of cold weather the foam disappears and the lacerated bark peels off, revealing the dead wood.

Isolations from diseased material yielded species of *Fusarium*, *Phytophthora*, *Botrytis*, and *Aspergillus*, but infection experiments with pure cultures carried out singly or in combination have given so far inconclusive results. The exudation was completely stopped after scraping the lesions and coating with Bordeaux paste, but this did not prevent the development of new lesions.

Nixon (R. W.). **Observations on the bayoud disease of Date Palms in Morocco.**—*Plant Dis. Reptr*, 34, 3, pp. 71–73, 1950. [Multilithed.]

During a visit to southern Morocco in March, 1949, the author inspected the once famous date palm region in the Ziz River valley, now ravaged by the 'baïoud' disease (*Fusarium albedinis*) [*R.A.M.*, 28, pp. 332, 522]. In the area between Ksar Es-Souk and Erfoud the palm population has probably been decreased by at least 50 per cent. The best commercial varieties Medjool and Bou Feggous are the most susceptible and threatened with extinction. The little esteemed Bou Slikhen is the most resistant.

Donk (M. A.). **Notes on Malesian fungi. I.**—*Bull. Jard. bot. Buitenz.*, Ser. III, 17, 4, pp. 473–482, 1948. [Received March, 1950.]

A study of the type material of *Polyporus coffeae* [*R.A.M.*, 26, p. 235 and below, p. 302], a fungus which lives in biocoenosis with Coccidae insects (*Pseudococcus deceptor* in Java) and is better known in connexion with phthiriosis of coffee in its imperfect state (*Bornetina corium*), showed that it is identical with *Daedalea*

philippinensis. This species was transferred to *Diacanthodes* by Singer. An examination of Singer's material and local specimens on a number of hosts has led the author to accept *Diacanthodes*. An emended description is provided and the distribution of *D. philippinensis* reviewed.

Leyendecker (P. J.). **Effect of modified cultural practices on Verticillium wilt of Cotton.**—*Iowa St. Coll. J. Sci.*, 24, 1, pp. 73–75, 1949.

The effects of soil moisture and temperature, different crop sequences, and fallow treatment on the severity of *Verticillium* wilt (*V. albo-atrum*) of cotton [*R.A.M.*, 29, pp. 26, 109] were studied in greenhouse and field experiments at the New Mexico College of Agriculture and Mechanic Arts over a three-year period. The field tests were made where cotton had been grown for a minimum of five years. Variety Acala 2815 was used in all tests. Wilt was most severe in a flat, relatively cool (21° C.) seed bed and less prevalent in one raised 15 in. (28° C.). Plants in an infrequently watered plot (15 acre in.; four irrigations) were stunted and they often wilted during midday heat but had only 32 per cent. infection compared with 48 in the same field with 30 acre in. water added. Under greenhouse conditions plants in steamed compost at 25 and 40 per cent. of the water-holding capacity were stunted and much smaller than those held at 50, 70, and 85 per cent. moisture. Infection was observed over a soil moisture range between 25 and 85 per cent. There was very little foliage injury at 25 and 40 per cent. but progressively more at 55 and 70. In a series of irrigated and dry fallow plots established in a field in which there was 75 to 85 per cent. infection the previous season, it was found that the pathogen did not disappear from soils that were moist and fallowed for one year, but severity of infection was reduced and yield increased in dry fallow areas. Less disease was evident when cotton was sown in a severely infested field after cropping with cantaloupe, sour clover (*Melilotus indica*), sweet clover (*M. officinalis*), or lucerne than after cotton.

Raychaudhuri (S. P.). **Oidiopsis gossypii (Wakef.) Raychaudhuri f. indica f. nov. on Cotton.**—*Trans. Brit. mycol. Soc.*, 32, 3–4, pp. 288–290, 2 figs., 1949.

The name proposed for the conidial state of a powdery mildew, which affected about 11 per cent. of the cotton plants at Dacca in December, 1941, is *Oidiopsis gossypii* (Wakef.) Raychaudhuri f. *indica* n. form. It has shorter and broader conidia, 37·5 by 23·8 (31 to 41 by 19 to 25) μ, than the species described by Miss E. M. Wakefield (*Kew Bull., 1920*, pp. 235–238) as *Ovulariopsis gossypii* [*R.A.M.*, 11, p. 512] and which at her suggestion is transferred by the author as *Oidiopsis gossypii* n. comb.

Heim (R.). **Les rapports entre les insectes et les champignons.** [The relationships between insects and fungi.]—Conférence faite au Palais de la Découverte, Paris, 24 pp., 1946. [Received March, 1950.]

The author discusses the complex relationships that exist between insects and fungi, with special reference to vine phthiriosis [*R.A.M.*, 14, p. 357] due to the association of *Bornetina corium* [*Polyporus coffeae*: see preceding page] with *Dactylopius* sp., the ambrosia fungi and *Xyleborus dispar* [ibid., 14, p. 374; cf. 27, p. 77], *Stereum sanguinolentum* and *Sirex* sp. [ibid., 21, p. 525; 27, p. 565], and the insects associated with *Cordyceps*, *Septobasidium*, *Engleromyces*, *Aschersonia*, *Xylaria*, and *Termitomyces* [ibid., 24, p. 503].

Kobayasi (Y.). **Several species of the genus Cordyceps and their conidial forms.**—*J. Jap. Bot.*, 24, 1–12, pp. 176–180, 3 figs., 1949.

Cordyceps sinclairii n.sp., the perfect state of *Isaria sinclairii* on *Meimuna*

opalifera, and *Hirsutella nutans* n.sp., the conidial state of *C. nutans* on *Erthesina fullo*, are described in Latin, and *C. crinalis* (conidial state unknown) on larvae of Lepidoptera in English, all with Japanese annotations.

Mathieson (J[ean]). **Cordyceps aphodii, a new species, on pasture Cockchafer grubs.**—*Trans. Brit. mycol. Soc.*, 32, 2, pp. 113–136, 3 pl., 10 figs., 1949.

During 1942 pastures in certain parts of Victoria were very seriously damaged by the common pasture cockchafer (*Aphodius howitti*). The larvae are frequently attacked by fungi in the field. On dead larvae were found the stromata of a *Cordyceps* and parasitic on these were two stilboid forms, *Tilachlidium brachiatum* and a member of the Discellaceae.

The *Cordyceps*, which is named *C. aphodii* n.sp., is characterized by a white mycelium in the endosclerotium, with hyphae about 2 μ wide and gemmae 7·5 to 15 μ by 6·25 to 8 μ. The caespitose, ochraceous-brown stromata generally arise from the head of the sclerotium, and measure 1 to 1·4 cm. by 1 to 1·5 mm. The cylindrical, equal, glabrous stem terminates in a concolorous fertile part, occasionally sterile at the tip, which is ovoid to cylindrical, often distorted as a result of the unequal development of perithecia, and 3 to 4 mm. long by about 1·5 mm. wide. The surface is rendered slightly papillate by the dark red-brown ostioles of the perithecia. These are arranged obliquely to the main axis, have upwardly curved necks, measure about 357 by 110 μ, and have a dark brown wall, 6·75 μ in width. The asci are 200 to 225 by 3·8 to 5 μ, the cap 8 by 5 μ; the ascospores are 90 to 151 μ long, while the oval part spores, flattened at each end, measure 5·5 to 7·5 by 1·25 to 2 μ.

There are two conidial states: A develops on the stromata and from the sclerotium. The conidiophores, about 50 to 60 μ in diameter, arise on the ends of monopodially branched hyphae and consist of an outer layer of buff-coloured tuberculate sterile hyphae with short lateral branches on the convex side. They enclose a cavity filled with colourless, oval conidia measuring 5 to 7·5 by 2 to 2·5 μ, which are budded off from a group of phialides at the apex of the stalk. Conidial state B, a species of *Hymenostilbe*, develops on the sides of the stromata and consists of a palisade layer of simple, smooth, russet-coloured phialides, 13 μ long, broadening slightly towards the apex 2 to 3 μ wide, each terminating in a fine sterigma which buds off slender, pip-shaped, hyaline, smooth, dry conidia measuring 5 by 1·25 μ.

Of the two parasites, the member of the Discellaceae may first appear as tufts of white hyphae arising from the sclerotium. These elongate and form white, branched or unbranched, cylindrical or fan-shaped clavae up to 2 cm. but usually 0·5 to 1 cm. high. A yellow, waxy layer develops in various positions on the club. In the white part the outer hyphae develop conidiophores at the apices, bearing chains of conidia at the tips of the branches, smooth, hyaline, oval; they measure 1·25 μ long and 2·5 to 3 μ broad. In the waxy areas the conidiophores form a very compact palisade layer and the phialides are more regular. The branches develop unilaterally and are usually bifurcate, but may be unbranched. The smooth, hyaline, globose spores measure 1·25 to 1·9 μ in diameter. They accumulate in a thick layer, enveloped at first in mucus, above the conidiophores. In culture spores from the white and yellow regions both produced exactly the same type of colony.

T. brachiatum also develops from the sclerotium as white tufts of hyphae, which elongate into groups of white clavae up to 7 mm. high. The smooth, hyaline, oval spores measure 0·75 to 3 by 0·5 to 1·75 μ.

Duddington (C. L.). **A new predacious species of Trichothecium.**—*Trans. Brit. mycol. Soc.*, 32, 3–4, pp. 284–287, 2 figs., 1949.

A description is given of the morphology and behaviour of *Trichothecium flagrans* n.sp., found capturing and destroying considerable numbers of nematodes in decaying vegetable matter [see next abstract] at Bedford College, London, in 1947.

Drechsler (C.). **Several species of Dactylella and Dactylaria that capture free-living nematodes.**—*Mycologia*, 42, 1, pp. 1–79, 15 figs., 1950.

Descriptions are given of the new species of Hyphomycetes, *Dactylella stenobrocha*, *D. aphrobrocha*, *D. cionopaga*, *Dactylaria eudermata*, *D. haptotyla*, and *D. sclerohypha*, which capture nematodes in decaying vegetable matter [*R.A.M.*, 26, p. 452; 27, p. 235; and preceding abstract.]

Medical Research Council Memorandum No. 23. Nomenclature of fungi pathogenic to Man and animals. Names recommended for use in Great Britain by the Medical Mycology Committee of the Medical Research Council.—*Med. Res. Coun. Memor.* 23, 12 pp., London, H.M. Stationery Office, 1949. 6*d*.

A recent census showed that the 65 species of fungi pathogenic to man and animals in the British Isles [Ainsworth (G. C.). List of fungi recorded as pathogenic for man and higher animals in Britain.—*Trans. Brit. mycol. Soc.*, 32, pp. 318–336, 1949] have been recorded in this country under 150 names and elsewhere under many more. The present list, for which no claim to completeness is made, has been prepared with the object of securing greater uniformity in the terminology applied to the commoner British medical fungi. The principles by which the Committee has been guided in its choice of names are briefly explained with appropriate examples.

Reinking (O. A.). **Bunchy top and other diseases of Abacá at Tawau, Mostyn and Sebatik Island, British North Borneo.**—*Plant Dis. Reptr*, 34, 3, pp. 63–65, 1950. [Multilithed.]

During an intensive survey of abacá [*Musa textilis*] plantations carried out in August, 1949 at Tawau, Mostyn, and Sebatik Island, British North Borneo, bunchy top [abacá bunchy top virus: *R.A.M.*, 27, p. 21; 29, p. 154] was found to be the most important disease. The insect vector (*Pentalonia nigronervosa*) was present in all plantations visited. All commercial varieties are susceptible, including Tangongon, Maguindanao, and Bongolanon. It is suggested that no banana plants should be planted near abacá [see below, p. 316].

Panama disease [*Fusarium oxysporum* var. *cubense*: ibid., 29, p. 154] was absent from both abacá and bananas and no other diseases of importance were noticed.

Gregory (P. H.). **Leaf diseases of Anemone coronaria in Cornwall.**—*Trans. Brit. mycol. Soc.*, 32, 3–4, pp. 241–245, 1 pl., 2 figs., 1949.

Of the leaf diseases observed on *Anemone coronaria* in south-west England during the years 1935 to 1940, winter browning [*R.A.M.*, 14, p. 676] was the most important. In moist, dull weather diseased tissues may become covered with a copious growth of *Botrytis cinerea* [cf. ibid., 19, p. 559], but strains isolated from diseased plants appear to be non-pathogenic. Anemones grown from seed usually remain healthy, while fields planted with corms are often devastated.

Cluster cup rust (*Puccinia pruni-spinosae*) [ibid., 21, p. 491] rarely occurs in annual commercial plantings, but in the second year rust may develop in the spring. *A. fulgens*, grown as a perennial from corms imported from France, may show up to 50 per cent. diseased plants. A corm may be only partly infected and produce both normal and hypertrophied shoots.

Powdery mildew (*Oidium* sp.) was first recorded at Penzance in October, 1935, as a slight attack on anemones grown from corms. Traces of mildew were present each autumn, but it became severe only in 1937 in the middle of October, when six acres of St. Brigid and anemone de Caen at St. Erth were badly affected. All were grown from corms from various sources. At the same time the disease was severe on anemone de Caen grown from seed at St. Hilary.

Downy mildew (*Plasmopara pygmaea*) [ibid., 17, p. 583] was observed at the end of September, 1937, in a field of anemone de Caen near Liskeard; the foliage blackened and died in about four days and oospores developed in the discoloured tissues. By December the crop had recovered and the plants were flowering normally again.

Downy mildew caused by *Peronospora ficariae* [*Bull. Minist. Agric., Lond.*, 126, p. 79, 1943], more common than *Plasmopara pygmaea*, was first observed on apparently healthy leaves of anemone de Caen at Penzance in September, 1935. Early in December, 1936, a severe attack occurred in four beds of *A. coronaria* at Newton Abbot [Devon]. The leaves had blackish, necrotic marginal lesions and were covered with conidiophores. The leaves were rolled upwards and the bracts were also affected. Zoospores were produced; the sporangia measured 28 to 39 by 23 to 30 μ and became swollen before germination. *Peronospora ficariae* may be more widespread and destructive than these records suggest.

Black leaf spot (*Septoria anemones* var. *coronariae*) occurs occasionally in autumn, usually forming conspicuous, sharply demarcated, dark, marginal spots on mature leaves. The diseased tissue appears dry and sunken and deeply discoloured by a brownish black pigment, and bears numerous black pycnidia. The disease was first noticed on a small plot of anemones at Gulval, near Penzance, in September, 1936. The spots were particularly numerous where the plants were shaded. The varieties affected included de Caen, St. Brigid, and Hollandia. The disease spread over the plot during October and November and persisted throughout the winter. During March, 1937, the foliage on the affected plants was killed by strong, dry winds, and the new foliage remained unaffected until December, 1938, when the disease reappeared within a few hundred yards of the first outbreak on anemones grown from seed the previous March. Microscopically the fungus on *A. coronaria* resembles *S. anemones* except that the spores are longer, measuring 30 to 42 μ in the Cornish material. The leaves readily turn dark brown when wounded or killed. The colour of the spots may be in part a character of the host. The fungus grows readily and sporulates on glucose-peptone and glucose-asparagine agars.

Laskaris (T.). **Fusarium stem canker and wilt of Delphinium.**—*Phytopathology*, 39, 11, pp. 913–919, 3 figs., 1949.

Fusarium oxysporum f. *delphinii* n.form is the name proposed for the causal organism of a stem canker and wilt disease of *Delphinium* in Connecticut, New Jersey, and New York, the former condition having been observed only on commerical garden hybrids while the latter also affects *D. cardinale* and *D. consolida*. The new form is characterized by very numerous, mostly non-septate microconidia and typically tri-, rarely quadri- or quinqueseptate macroconidia, tapering towards both ends, slightly pedicellate, usually uniformly curved throughout, measuring 23·1 to 42·9 by 3 to 4·3 (32·6 by 3·4) μ. On potato dextrose agar the well-developed aerial mycelium, colourless at first, turns light pinkish to vinaceous. Large salmon-coloured sporodochia are produced on the host but not in culture. Chlamydospores from a 53-day-old potato plug culture were terminal or intercalary, non-septate, and 8·6 by 7 μ.

The first symptoms to develop on plants sprayed with a spore suspension of the stem canker strain were small, brown to brownish-grey, gradually expanding, sometimes coalescent spots on the stems. Brown, sunken, water-soaked lesions may appear on the petioles and spread to the stem; on large plants the chocolate-brown, moist cankers may attain over 1 ft. in length. Ultimately the central tissue of the canker may shrink or collapse, while the thin epidermal layer remains intact and appears white or bleached. Numerous sporodochia with triseptate conidia are irregularly distributed over the canker, and the pich cavity is almost completely

filled with mycelium and many non- or uniseptate spores. On reaching the crown the fungus causes a local necrosis, invading and discolouring the vascular tissues, and the young basal shoots soon wilt. The parts of the stem above the canker may also wilt in the final stages of the disease.

Fusarium wilt is distinguishable from the superficially similar disease caused by *Sclerotium delphinii* and *S. rolfsii* [*R.A.M.*, 26, p. 341; 27, p. 477] by the absence of the characteristic sclerotia and mycelium of these species. A brown, vascular discoloration, as in stem canker, may extend from the crown to the main roots and upwards into the main stem and young shoots. It is sometimes accompanied by foliar chlorosis and wilting and drooping of the inflorescence.

There was a close resemblance between the isolates (upwards of 40) from plants affected by stem canker and wilt, and Dr. W. C. Snyder identified the pathogen as a representative of the species-group *F. oxysporum* [ibid., 19, p. 495]. Since the parasitic forms of *F. oxysporum* are highly specialized as to host and no species of *Fusarium* has yet been reported as pathogenic to *Delphinium*, the designation of the stem canker and wilt organism as a new form appeared justifiable.

An account is given of greenhouse and field inoculation experiments with stem canker and wilt isolates, the pathogenicity of which proved to be of a high order.

Peiris (J. W. L.). **The Botrytis disease of Gladiolus with special reference to the causal organism.**—*Trans. Brit. mycol. Soc.*, 32, 3–4, pp. 291–304, 1949.

Studies at the Imperial College of Science in 1945–6 on *Botrytis* disease of gladioli [*R.A.M.*, 26, p. 58] showed that the symptoms were in substantial agreement with those described by Moore [ibid., 19, p. 153], and that the three types of corm symptoms mentioned by him are different phases of the same disease. The symptoms on corms and flowers were constantly associated with a species of *Botrytis*, which in morphology and cultural characters was identical with *B. gladiolorum* [ibid., 28, p. 575; 29, p. 141]. This fungus was more pathogenic than *B. cinerea* on wounded Lilac Wonder corms and on flowers and shoots, the rate of attack being greatest at a storage temperature of about 15°. *B. cinerea* proved more pathogenic than *B. gladiolorum*, however, to turnip, swede, and lettuce. Inoculations of shoots did not increase storage rot. It is concluded, therefore, that the high proportion of infection contracted after lifting which leads to storage rot occurs probably on the drying racks. Measures for controlling the disease include planting in soil not subject to waterlogging, early lifting, rapid drying at high temperatures, and early cleaning.

B. gladiolorum sporulated best on media consisting of a decoction of gladiolus leaves or glucose-peptone. Conidia were formed only in good light when the medium was moderately dry. The description of *B. gladiolorum* herein provided agrees with that of Timmermans [ibid., 25, p. 501]. The features are considered to be sufficiently distinctive to warrant specific status. The descriptions of isolates of *Botrytis* obtained from gladiolus by previous workers (except Klebahn's *B. gladioli*) all appear to be similar to *B. gladiolorum* and were probably isolates of that species.

Jenkins (J. M.). **Gladiolus corm treatments at Wilmington, N.C.**—*Bull. N. Amer. Gladiolus Coun.* 18, p. 49, 1949. [Abs. in *Chem. Abstr.*, 43, 22, p. 9338, 1949.]

Picardy gladiolus corms, heavily infected by *Fusarium* [*oxysporum* f. *gladioli*: see next abstract] during the previous year, were treated with arasan dust, and produced the best stand of healthy plants (84 per cent.), 100 per cent. sound corms being harvested. New improved ceresan dip was almost equally effective, but fermate dust and mersolite 8 dip gave considerably lower corm yields and the untreated only 14 per cent.

YODER (D. M.). **Bulb diseases.**—*N.Y. St. Flower Grs' Bull.* 49, pp. 4–5, 1949. [Abs. in *Chem. Abstr.*, 43, 22, pp. 9337–9338, 1949.]

Basal rot of *Narcissus* [*Fusarium oxysporum* f. *narcissi*: *R.A.M.*, 27, p. 512] was controlled by five minutes' immersion of the bulbs in a solution of mersolite 8 [cf. ibid., 26, p. 167] (1 lb. per 800 gals. water); an extension of the period of treatment to three hours was more effective in reducing infection but caused some delay in flowering. The bulbs can be treated just after lifting and at planting time.

Silver nitrate, dithane D-14, karbam, fermate, and zerlate gave promising results in the control of tulip 'fire' (*Botrytis*) [*tulipae*: ibid., 27, p. 512; cf. also ibid., 29, p. 214], but did not entirely eliminate infection.

Fusarium rots of gladiolus [including *F. oxysporum* f. *gladioli*: ibid., 29, p. 28 and preceding abstract] were most effectively combated by new improved ceresan [ibid., 29, p. 88] or mercuric chloride dips; the latter tend to retard flowering, but production from treated corms is usually superior to that from untreated. Lysol, dow 9 B, and ceresan M were also generally satisfactory as dips, while arasan dust also gave encouraging results and did not delay flowering. No correlation exists between the leaf spot and corm rot of gladiolus caused by *B.* [*gladiolorum*: ibid., 28, p. 399 and preceding page]. Properly cured and stored, the corms from severely infected plants develop a negligible amount of rot in storage, but under moist conditions the damage may be serious. Weekly applications of dithane D-14 or parzate sprays afford good protection against foliar invasion by *B. gladiolorum*.

AINSWORTH (G. C.). **The Gladiolus smut.**—*Trans. Brit. mycol. Soc.*, 32, 3–4, pp. 255–257, 1949.

The author sets out to clarify the status of the gladiolus smut. From a comparative study of material provided by Dodge and of English material he agrees with Hotson that there are two distinct diseases involved [*R.A.M.*, 21, p. 258]. One is undoubtedly a *Papulospora* (*P. dodgei*) [ibid., 22, p. 67] and the other a species of *Urocystis*. A search for type material of *U. gladioli* disclosed that it was undoubtedly a species of *Papulospora*. The name *Uredo gladioli* is rejected as a *nomen ambiguum* and, therefore, *Urocystis gladiolicola* n.sp. is proposed for the gladiolus smut, type material being taken from cultivated plants collected at Stoke Climsland, Cornwall.

MOORE (W. C.). **Grey bulb rot of Tulip.**—*J. Roy. hort. Soc.*, 75, 3, pp. 113–117, 2 figs., 3 maps, 1950.

The author, after noting that grey bulb rot (*Sclerotium tuliparum*) of tulip has spread to most counties in England and has reached Wales since it was recognized in this country in 1922, gives the symptoms and possible methods of control of the disease [*R.A.M.*, 29, p. 141]. The fungus remains alive in the soil for three to four years and bulbous irises and tulips should not be planted in infested ground unless some form of sterilization is applied.

MACLEAN (N. A.). **New hosts for Botrytis cinerea and B. elliptica in the Pacific Northwest.**—*Phytopathology*, 39, 11, pp. 949–950, 1949.

During the past year *Botrytis cinerea* and *B. elliptica* [*R.A.M.*, 26, p. 154] were observed on new hosts in Washington, the former on *Gerbera jamesonii* and the latter on *Erythronium grandiflorum* var. *pallidum*. Greenhouse plants of *G. jamesonii* developed a virulent crown rot in unsterilized soil previously used for *Ranunculus*, which had also been badly attacked by the grey mould. *B. elliptica* caused spotting of the stems, leaves, and petals of *E. grandiflorum* var. *pallidum* in an open stand of *Pinus ponderosa*. The circular spots, 0·5 to 2 mm. in diameter, were surrounded by dark brown, slightly raised borders, and the centres were pale tan. On the more severely infected portions of the plants the lesions had coalesced to form large, dark brown, necrotic areas.

Beck (G. E.) & Vaughn (J. R.). **Botrytis leaf and blossom blight of Saintpaulia.**—*Phytopathology*, 39, 12, pp. 1054–1056, 1949.

A fungus identified by Dr. C. J. Alexopoulous as *Botrytis cinerea* has been isolated from the tissues of greenhouse-grown *Saintpaulia ionantha*, a popular house plant of considerable commercial importance, at the Michigan State College. Infection usually originates on the under side of the petioles near the pot rim in the form of a small, translucent lesion, tending to rapid enlargement and lengthwise extension through the leaf blade, and turning black with age. The blossom-blight phase of the disease, often originating in the throat of the corolla, produces premature fading and a water-soaked aspect. Profuse sporulation may occur on the infected tissue under favourable environmental conditions, i.e., low light intensity, high humidity, and defective air circulation.

Inoculation experiments with spore suspensions from potato dextrose agar cultures resulted in the development of the blossom-blight phase after a minimum period of four days. The fungus was easily re-isolated from the experimental lesions. Symptoms indistinguishable from those described above also developed on *S. ionantha* inoculated with isolates of *B. cinerea* from peony, tulip, and geranium [*Pelargonium* sp.: *R.A.M.*, 5, p. 611].

Among the most effective measures for the control of the disease are sanitation (including the use of a sterile rooting medium for propagation and of sterilized potting soil), and adequate spacing to ensure free air circulation and obviate contact between the plants. Reasonably high relative humidity and low light intensity are necessary for the best growth of the plants, but a light intensity below about 450 foot-candles is inadvisable.

Hopkins (J. C.) & Dowson (W. J.). **A bacterial leaf and flower disease of Zinnia in Southern Rhodesia.**—*Trans. Brit. mycol. Soc.*, 32, 3–4, pp. 252–254, 1 pl., 1949.

An angular leaf spot of *Zinnia* [*elegans*] was first observed in Southern Rhodesia about 12 years ago, but was not reported again until March, 1945, when the leaves and flowers of a large bed of plants at the Plant Pathological Laboratory, Salisbury, were severely affected. The disease is due to a bacterial pathogen [cf. *R.A.M.*, 9, p. 316] and starts as diffuse, yellowish, translucent, circular leaf spots, 1 to 2 mm. in diameter, enlarging slowly with intermittent rainfall to about 5 mm., or rapidly with high humidity to large necrotic, ragged patches, becoming angular in shape, with small reddish brown spots developing in the centre. Each lesion is surrounded by a narrow margin of yellowish tissue. They may coalesce into rectangular areas 0·5 to 1 cm. long. Linear lesions may also form along the veins, developing into large, dead areas involving most of the lamina. When atmospheric humidity is very high small brown spots may be produced on the ray florets. If infection is severe the heads are seriously disfigured and may decay completely.

Suspensions of a yellow bacterium, isolated from the lesions, were atomized on to young *Zinnia* plants and caused infection; the bacterium was re-isolated twice. Of the *Zinnia* varieties so far tested, Purple Prince, Brightness, Royal Purple, and Lavender Queen are highly susceptible. Yellow-flowered varieties develop mainly marginal infection, while red seem to be intermediate.

The characters of the bacterium indicated that it is closely related to *Xanthomonas nigromaculans*, which has been reported as causing black spots on the leaves of *Arctium lappa* in Japan (*J. Plant Prot., Tokyo*, 14, p. 519, 1927). A brief technical description of the *Zinnia* pathogen, which does not infect *Arctium*, is appended and it is provisionally designated *X. nigromaculans* f. *zinniae* n.form.

Ark (P. A.) & Middleton (J. T.). **Pythium black rot of Cattleya.**—*Phytopathology*, 39, 12, pp. 1060–1064, 2 figs., 1949.

The fungus isolated from *Cattleya* orchids suffering from black rot [cf. *R.A.M.*,

25, p. 502] in California was found to conform with *Pythium ultimum* as previously defined [ibid., 22, p. 373]. The disease is widely distributed and sometimes severe on *C. fabia*, *C. forbesii*, *C. mossiae*, and *C. trianae*. Its course is rapid, a black discoloration of the growing point of seedlings being followed by complete desiccation. On the leaves of small plants black spots of varying size may coalesce into necrotic areas, while in those of two or three years old infection may originate in the root and spread towards the pseudo-bulb. The affected roots die and the pseudo-bulbs shrivel, finally losing all their contents. The rot may also start at the leaf tip and pass rapidly downwards under very humid conditions. A black, shiny discoloration appears on the leaf blades of large plants. The tissues sometimes become soft and flaccid, exuding water copiously on slight pressure. Later the tissues collapse and the early translucency of the leaves disappears. In either of these modes of infection the pseudo-bulb between the crown and the leaf blade may become involved, being converted into a black mass by the longitudinal and transverse enlargement of pale yellow to light brown streaks. Infection may pass from one pseudo-bulb to another until the whole plant is defoliated and reduced to a mass of mummified pseudo-bulbs.

Reproductive organs, rarely produced on potato dextrose agar, developed in profusion when blocks of cultures were transferred from this medium to maize meal or plain water agar. The sporangia germinated by the production of zoospores in a vesicle borne on a short emission tube instead of producing germ-tubes as is usual in *P. ultimum*.

Inoculation experiments on young pseudo-bulbs of *C. trianae* maintained at high humidity and a temperature of 65° to 75° F. resulted in the development of black rot symptoms after two days, followed by the rapid progress of infection. *P. ultimum* was re-isolated from the diseased plants. When zoospores were sprayed on an unfolded leaf of a young plant, black spots appeared five to eight days later, suggesting the mode of dissemination in orchid houses where overhead irrigation is practised. Positive results were also obtained in tests on *C. fabia*, *C. forbesii*, *C. mossiae*, and *Epidendrum o'brienianum*.

The seedling phase of the black rot was combated by watering the pots with a 1 in 2,000 concentration of 8-hydroxyquinoline benzoate (bioquin 700) [cf. ibid., 27, pp. 484, 547], which may safely be repeated weekly, while a copper solution of 1 in 100,000 or 1 in 1,000,000 was also effective, but should be used more sparingly. The treatment of large plants should be based on reduction of atmospheric humidity, maintenance in a dry state, and provision of ample ventilation, supplemented if necessary by exposure to the sun.

Jensen (D. D.). **Breaking of Cattleya Orchid flowers by Orchid mosaic virus and its transmission by aphids.**—*Phytopathology*, 39, 12, pp. 1056–1059, 1 fig., 1949.

A virus disease of *Cattleya* orchids causing floral colour-breaking and distortion and foliar mottling and malformation has been observed in California for many years. Affected plants tend to become weak and stunted and to produce progressively fewer flowers than normal. The presence of the virus in imported tropical American plants on arrival in the State is suspected by some commercial growers in the San Francisco Bay region.

In experiments on *C. mossiae* and *C. trianae*, the species most commonly attacked, attempts at the transmission of the virus from plant to plant by juice inoculation were unsuccessful, but *Myzus persicae* proved to be a vector of the disease. The aphids (100 to 300 per test) were reared on sugar beets, allowed to feed for 24 to 48 hours on unopened buds or open broken flowers of infected orchids, and then conveyed to healthy plants. In two cases the aphid-infested inoculum was caged on healthy plants. In eight tests viruliferous aphids were caged on healthy plants within a day after the emergence of the buds from the sheaths. Seven of these

plants developed mosaic symptoms. In five breaking appeared in the flowers initially infected, followed by foliar symptoms, while in two the flowers fed upon were not affected, but new leaves formed after inoculation contracted the disease. The incubation periods of the virus in the flowers and leaves ranged from 12 to 19 days and $2\frac{1}{2}$ to $4\frac{1}{2}$ months, respectively. Transmission was accomplished in two out of three tests in which infective aphids were caged on the young leaves of three plants without flower buds. The first plant infected through the leaf was *C. trianae*. The symptoms were first observed on the inoculated leaf 32 days after infection, and a new shoot, arising from a different part of the plant, began to show the disease 40 days after the inception of the test.

The identity of the *Cattleya* virus has not yet been established, but it differs from the tomato spotted wilt virus in being transmissible by aphids and not communicable by means of mechanically inoculated orchid juice to *Tropaeolum majus*.

Ark (P. A.) & Dickey (R. S.). **Corticium crown rot of Gazania.**—*Phytopathology*, 39, 12, pp. 1053–1054, 1 fig., 1949.

In 1948 nearly all the plants of *Gazania rigens*, commonly grown in California as ground cover or as an ornamental border plant, were severely attacked by crown rot in nursery flats in Stanislaus County and in three outdoor plantings in Alameda County. Infection originates at or below soil-level. On the aerial organs the symptoms appear as a wilting and withering of the leaves from the base upwards, sometimes accompanied by twisting. The limp, dead leaves and petioles fall to the ground and the diseased crown appears as a dark brown to black mass of dead stems.

The fungus isolated on acidulated potato dextrose agar from the infected petioles and stems was identified by Dr. B. Houston as *Corticium solani*. The optimum temperature for its growth ranged from 28° to 34° C., with a maximum below 40°. Inoculation experiments, in which fragments of the mycelial mat from Czapek's culture solution were poured over or mixed with sterilized soil in pots containing healthy *G. rigens* plants, were successful only in the greenhouse at and above 28°. Under these conditions wilting began after one week, and the plants were entirely destroyed in six weeks. In nature, too, the disease is restricted to the warmer regions in the interior of the State. *G. uniflora* and *G. splendens* also proved to be susceptible to the crown rot in these trials.

Boyle (Alice M.). **Further studies of the bacterial necrosis of the Giant Cactus.**—*Phytopathology*, 39, 12, pp. 1029–1052, 8 figs., 1949.

Previous work on the bacterial necrosis (*Erwinia carnegieana*) of the giant cactus (*Carnegiea gigantea*) [*R.A.M.*, 28, p. 17] is reviewed. The disease is spreading rapidly and assuming considerable importance in Arizona.

Three potential methods of dissemination are discussed, namely, contact between the root systems of infected and healthy plants in a group; saturation of the ground round a diseased plant, which provides infective material for the spread of the pathogen to other individuals through wounds in the roots; and by the insect vector, *Cactobrosis fernaldialis*, the principal factor in the rapid progress of the necrosis in the giant cactus forests of the State. Other insects, e.g., *Volucella* sp. and *Hololepta yucateca*, may also be concerned to some extent in the dispersal of the bacterium.

The results of cultural studies on *E. carnegieana* in comparison with *E. carotovora* [ibid., 28, p. 512] are fully described and tabulated. While both belong to the soft rot group on the basis of physiological and cultural characters, agglutination tests revealed no antigenic relationship between *E. carnegieana* and the four isolates of *E. carotovora* used (one each from onion, garlic, spinach, and carrot). Besides

this difference, *E. carnegieana*, unlike *E. carotovora*, is inhibited by penicillin, and the thermal death point of the former (59° C.) is 7° above that of the latter.

The determination of the vector of the pathogen and its life-history should provide a scientific basis for more effective control methods [ibid., 21, p. 518].

Petrak (F.). **Über die Leptopeltineen.** [On the Leptopeltineae.]—*Sydowia*, 1, 4–6, pp. 232–247, 1947.

An emended diagnosis is given of *Leptopeltis* v. Höhn., of which the type species is *L. aquilina* (Fr.) Petr. (syn. *L. pteridis* and six others) on *Pteridium*. *Leptopeltina* n.gen. is represented by *L. filicina* (Lib.) Petr. n.comb. and *L. jaapi* (Rehm) Petr. n.comb. The new genus *Moeszopeltis*, distinguished from the foregoing in the structure of the hypostroma and the one-celled spores, is founded to accommodate *M. gregoria* n.sp. on the fronds of *Phegopteris polypodioides* in Norway. The type species of *Leptopeltopsis* n.gen. is *L. nebulosa* n.sp. on the fronds of *Athyrium filix-femina* in various localities, especially in Moravia [Czechoslovakia]. A key to the genera is provided.

Mahmud (K. A.). **A new root-rot disease of Cyperus spp.**—*Curr. Sci.*, 19, 2, pp. 65–66, 1950.

During December, 1947, at Nagpur, India, six-month-old plants of *Cyperus papyrus*, *C. alternifolius*, and *C. eleusinoides* were affected by a root rot. *Pythium intermedium* was observed in the tissues and was isolated from them. It is reported for the first time on these hosts. Pathogenicity tests, however, were negative.

Jones (F. R.). **Resistance in Alfalfa to yellow leaf blotch.**—*Phytopathology*, 39, 12, pp. 1064–1065, 1949.

Resistance in lucerne to yellow leaf blotch (*Pseudopeziza jonesii*) [*R.A.M.*, 17, p. 325] was observed in two groups of selected plants in the nursery at Madison, Wisconsin. The first consisted of two out of four clones derived from survivors selected in 1944 from a row of Conference Number A31, which had attracted attention by reason of their resistance to leaf spot (*P. medicaginis*) [ibid., 27, p. 24]. The second group comprised selections from a field of Kansas Common lucerne sown in 1947 and affording an unusual opportunity in the autumn of that year for the selection of plants resistant to *P. medicaginis*, which was present in great abundance, mixed with a small proportion of *Pleospora herbarum*. From this field 21 plants with clean foliage were obtained, the frequency of such plants being of the order of hundredths of 1 per cent. By the spring of 1949 some of these selections had been discarded as unsatisfactory, but 14 were still represented in the nursery by clones and small populations secured by selfing. In the first growth leaf spot developed very late and sparsely, but yellow leaf blotch appeared early in moderate amount, apparently from a single brief period of infection, and a few particularly susceptible clones had lost their lower leaves by mid-June. Among the 14 clones and selfed progenies resistant to *Pseudopeziza medicaginis*, four retained lower leaves almost free from *P. jonesii* up to 23rd June, but on the 29th well-developed lesions were observed on the basal foliage of two. The testing of the apparent resistance in the other two clones by controlled artificial inoculations still requires to be done.

Kernkamp (M. F.), Gibler (J. W.), & Elling (L. J.). **Damping-off of Alfalfa cuttings caused by Rhizoctonia solani.**—*Phytopathology*, 39, 11, pp. 928–935, 3 figs., 1949.

The results of investigations at the Minnesota Agricultural Experiment Station confirmed the conclusions of Grandfield *et al.* as to the implication of *Rhizoctonia* [*Corticium*] *solani* in the damping-off of lucerne cuttings raised in the greenhouse in

the breeding of disease-resistant varieties [*R.A.M.*, 28, p. 18]. The fungus was introduced into greenhouse flats and benches on the cuttings themselves from infested flats and benches and from infested soil and vermiculite.

The disease was effectively combated by autoclaving the flats and vermiculite, while partial sterilization of the bench soil with formaldehyde helped to prevent contamination from that source when the flats were placed in sterile clay saucers to obviate contact with the soil in the benches. Phygon, applied dry at a dosage of 3 gm. per sq. ft., afforded a measure of protection to cuttings planted in infested vermiculite, and definitely prevented infection when used as a dip for inoculated cuttings.

In 1947–8 about half the cuttings were lost through infection by *C. solani*. During the next autumn and winter control methods were applied and practically no loss was sustained in some 12,000 cuttings from 70 clones in the rooting medium. Five months after transplanting to freshly filled benches 55 clones were free from the disease, but the remaining 15 showed varying degrees of infection, probably attributable to natural infestation of the field soil.

Weber (Anna). **Mangelsygdomme.** [Deficiency diseases.]—Reprinted from *Erhvervsfrugtavleren, 1948*, 1, 10 pp., 3 figs., 1948. [Received March, 1950.]

This paper on the diseases of fruit associated with deficiencies of iron and manganese (lime-induced chlorosis), magnesium, and zinc, and their control is a slightly abridged translation of D. Mulder's 'Consequences of unbalanced nutrition of fruit trees' (*Meded. Tuinb.* 3, 1948) [see next abstract], supplemented by observations on the occurrence of these conditions in Danish orchards.

Mulder (D.). **De taal der bladeren als uiting van de voedingstoestand van de vruchtbomen.** [The language of the leaves as an expression of the nutritional status of fruit trees.]—*Fruitteelt*, 38, 24, pp. 389–392, 6 col. figs., 1948. [Received 1950.]

The symptoms of deficiency of nitrogen, iron and manganese (lime-induced chlorosis), potash, magnesium, phosphorus (and its excess), zinc, and boron on fruit trees in Holland [*R.A.M.*, 29, p. 262 and preceding abstract] are described with directions for their control by the supply of the missing elements in the form of fertilizers, injections, or sprays. There are three reasons for the enhanced incidence of this group of diseases during the last ten years, namely, (1) the increasing use of artificial fertilizers containing only nitrogen, phosphorus, potash, and calcium (hence deficiency diseases), with an accompanying accumulation of certain elements in the soil (resulting in excess); (2) sinking of the ground water-level in old fruit-growing districts, leading to water shortage and the deficiencies associated therewith; and (3) intensive tillage, involving a decrease in the quantity of organic matter in the soil, and consequently in its capacity to supply the roots with nutrients in a readily assimilable form.

Lindner (R. C.), Weeks (T. E.), & Kirkpatrick (H. C.). **A qualitative chemical test for some stone fruit virus diseases.**—*Phytopathology*, 39, 12, pp. 1059–1060, 1949.

During 1948 a simple qualitative test was devised which has proved useful in laboratory and field tests for the diagnosis of stone fruit virus diseases. Foliar tissue is generally used, but when the test is performed on cherry fruit tissue it appears to be specific for the 'little cherry' complex [*R.A.M.*, 28, p. 222; 29, p. 265]. A leaf sample is taken from the middle portion of a leaf, either directly through the midrib (the more sensitive area) or half way between it and the margin by means of a paper punch cutting a disk of tissue $\frac{1}{4}$ in. in diameter. A single disk is then placed in a test tube with 1 ml. 4 per cent. sodium hydroxide, which is heated over

a flame until the contents have boiled for about 15 seconds. After cooling for 30 seconds the tube is very vigorously shaken to introduce air into the solution. Oxygen from the air serves as an oxidizing agent to produce a coloration, pink or red indicating a positive and green a negative reaction.

The milder virus diseases of sweet cherries, e.g., those of the 'ring spot' or latent group, give varying shades of pink or light red, while a deep red coloration is induced by the more virulent ones, such as little cherry, rusty mottle [ibid., 28, p. 563], or twisted leaf [ibid., 22, p. 317]. Only the more severe peach diseases evoke a positive reaction in the leaf tissue, Western X-disease [? a strain of peach X-disease virus: ibid., 28, p. 223] being the only virus falling into this class in Washington.

Care should be taken in sampling to avoid leaves from girdled branches, while misleading results may also be given by reddened areas on peach foliage due to nitrogen deficiency, arsenical injury, or *Coryneum* blight [*Clasterosporium carpophilum*]. Only the spur leaves of cherry should be used. When fruit tissue is required for 'little cherry' tests, a cube of about 4 mm. is cut from the cheek and treated like the foliar tissue. Any shade of pink or red is indicative of a positive reaction and yellow or brown of a negative one. The fruit should have reached the stage of incipient colouring or softening. The presence of little cherry virus in sour cherry fruit samples is denoted by a distinctive red colour. Since this virus is usually not uniformly systemic, comparative tests of healthy and diseased fruits from the same tree should be made to ensure a correct diagnosis on the basis of colour differentiation.

Moore (M. H.). **Progress in fruit-spraying methods.**—*World Crops*, 2, 3, pp. 125–129, 7 figs., 1950.

The information in this paper has already been noted from another source [*R.A.M.*, 29, p. 220].

Wenzl (H.). **Zur Systematik der europäischen Obstbaum-Sclerotinien.** [On the systematics of the European fruit tree *Sclerotiniae.*]—*Sydowia*, 2, 1–6, pp. 244–254, 1948.

On the basis of a comparative study of the shape, size, and consistency of the conidial stromata of Sclerotineae on fruit, their seasonal rhythm of development, and the dimensions and longevity of the conidia, germ-tube development, aspect of agar plate cultures, and mode of infection, the author concludes that apart from *S. fructigena*, the only species occurring in Europe on apricot and other stone fruits is *S. laxa* [*R.A.M.*, 28, p. 178], the synonymy of which includes *S. cinerea.*

Moore (M. H.). **The brown rot problem.**—*Gdnrs' Chron.*, Ser. 3, 127, 3296, 3297, pp. 99–100, 104, 1950.

The exceptional prevalence of brown rot (*Monilia* [*Sclerotinia*] *fructigena*) infection on fruits, particularly apples, in Great Britain in 1949 led the author to survey control problems. Spraying [*R.A.M.*, 29, p. 102] appears to be successful only if every fresh wound is covered. It was demonstrated that spraying to prevent the avoidable wounds [ibid., 28, p. 323] due to codling moth [*Carpocapsa pomonella*] and scab [*Venturia inaequalis*] saved 30 per cent. of the total crop.

Plums and cherries are more liable to unavoidable wounding than apples and pears, and the blossom wilt fungus [*S. laxa*] tends to increase the total amount of rotting.

Wallace (T.). **The production of quality in Apples.**—*J. Roy. hort. Soc.*, 75, 3, pp. 91–106, 3 figs., 1950.

In this lecture, in which the author discusses the factors determining quality of

apples, the effects of mineral deficiencies and other physiological disorders on fruits on the tree and in store, and freedom from virus diseases are mentioned.

CARNE (W. M.). **The non-parasitic disorders of Apple fruits in Australia.**—*Bull. Coun. sci. industr. Res. Aust.* 238, 83 pp., 24 pl., 1948. [Received March, 1950.]

This comprehensive survey contains an emended classification of all the non-parasitic disorders of Australian-grown apples on the tree, after picking, and in storage. Included are chapters on the factors influencing the susceptibility of apples to the disorders [*R.A.M.*, 19, p. 545], and on symptoms and causes. There are 33 sections dealing, among others, with premature falling, persistent chlorophyll, wilt, russeting, core and skin disorders [ibid., 10, pp. 115, 467; 14, pp. 242, 769], breakdowns [ibid., 15, p. 301], and brown heart [ibid., 17, p. 462]. Boron deficiency disorders (cork) are also discussed [ibid., 16, p. 470]. Many of the disorders are illustrated.

FIDLER (J. C.). **Studies of the physiologically-active volatile organic compounds produced by fruits : II. The rate of production of carbon dioxide and of volatile organic compounds by King Edward VII Apples in gas storage, and the effect of removal of the volatiles from the atmosphere of the store on the incidence of superficial scald.**—*J. hort. Sci.*, 25, 2, pp. 81–110, 13 graphs, 1950.

Experiments designed to test methods of preventing superficial scald in apples [*R.A.M.*, 29, p. 33] were carried out at the Ditton Laboratory using King Edward VII apples, some in oiled wrappers, others unwrapped in store at 38° to 40° F. with circulated air containing 8½ per cent. carbon dioxide and 13 per cent. oxygen, filtered through carbon filters, and the rest unwrapped without filters. Complete removal of volatile vapours by means of filters from the atmosphere is not practical when apples are stored on a commercial scale. Oiled wrappers proved more efficient than filters in preventing scald and have no immediate substitute for this purpose. Scalded apples in oiled wrappers amounted to 10 per cent. compared with 42 per cent. in unbrominated carbon-filtered gas and 44 per cent. in the unwrapped controls in unfiltered gas. A certain measure of scald control (24 per cent. incidence) was obtained with a brominated active carbon filter, which removed the odorous volatiles and ethylene fairly efficiently.

It is concluded that one of the factors causing scald is a substance of very low volatility (Factor Y) at the temperature of storage and it can only be removed by agents in contact with or very close to the skin. A new theory is advanced, namely, that scald can occur only in the presence of both Factor Y and a Factor X, which is not volatile.

KESSLER (H.). **Die Niederschlagsarmut während der Wächstumsperiode im Zusammenhang mit der Korkkrankheit des Glockenapfels.** [Rainfall deficiency during the growing period in relation to internal cork disease of the Glocken Apple.]—*Schweiz. Z. Obst- u. Weinb.*, 59, 1, pp. 8–12; 2, pp. 26–31, 5 figs., 1950.

In connexion with the development of internal cork on Glocken apples in the canton of Thurgau, Switzerland, towards the end of the 1948–9 storage period, and its detection on fruits of the same variety picked in October, 1949, some important contributions to the literature on the disease are briefly reviewed and local observations summarized. The affected orchards, both at Frauenfeld, Thurgau, and at Egg, Zürich (whence another consignment of corky apples was received), were situated on very permeable soils, faced south, and were much exposed to the wind, so that they naturally suffered from the summer drought of 1949. Another factor contributing to the development of internal cork was the low June and July rainfall (43 and 31 mm., respectively, at Frauenfeld as compared with a mean of 115 and 112 mm., respectively, for the period 1901 to 1940). Boron deficiency was also

indicated by comparative colorimetric analyses of diseased and healthy fruits on the lines suggested by experiments in New Zealand [*R.A.M.*, 19, p. 29].

Ter Pelkwijk (A. J.). **Waarnemingen over Appelschurft op Sierappels te Wijster (Dr.).** [Observations on Apple scab on Crab Apples at Wijster (Dr.).]—*Tijdschr. PlZiekt*, 55, 6, pp. 312–314, 1949. [English summary.]

A tabulated account is given of observations at the Biological Station, Wijster, Drenthe, Holland, in 1947, 1948, and 1949 on the reactions of 37 species and varieties of crab apples to scab (*Venturia inaequalis*) [*R.A.M.*, 29, p. 158]. The incidence of the disease was low in the first year but rose progressively during the next two seasons. The only species attacked in 1947 were ×*Malus purpurea* (Aldenham's Purple), Cheal's Crimson (*M. prunifolia* hybrid), ×*M. robusta*, and Gold Crab (a hybrid of unknown origin). No scab developed in 1948 or 1949 on ×*M. magdeburgensis*, ×*M. micromalus*, *M. hupehensis*, *M. halliana*, *M. atrosanguinea*, *M. floribunda*, *M. sargenti*, *M. transitoria*, *M. pratti*, *M. yunnanensis veitchii*, *M. trilobata*, and Allred (hybrid). *M. toringoides* and *M. soulardii* were free from infection in 1948, but the fruits of both species were attacked in 1949.

Biraghi (A.). **Nota preliminare su una probabile nuova virosi del Pesco.** [A preliminary note on a probable new virus disease of Peach.]—*Notiz. Malatt. Piante, 1949*, 6, pp. 33–35, 1949. [Mimeographed.]

In the spring of 1948 the branches of Gambetta bianca tardiva and Waddel peach trees growing near Savona, Italy, which for some years had shown progressive reduction of crop, developed shortened internodes with crowded foliage. When only some of the branches were affected those of normal length bore numerous leaves with yellow marginal areas. Sometimes the chlorotic areas were more extensive, affecting the distal parts; the discoloration then tended to be various shades of pale green. According to the growers, after a year or two the branches with shortened internodes developed progressive defoliation, the last leaves to fall being those at the tip. The branches then dried from the tip to the base, and finally died. Young trees were much more severely affected than older ones.

No parasitic organism was found in diseased material, and it is tentatively assumed that the condition is of virus origin. Further investigations are to be made.

Prentice (I. W.) & Harris (R. V.). **Mosaic disease of the Raspberry in Great Britain. III. Further experiments in symptom analysis.**—*J. hort. Sci.*, 25, 2, pp. 122–127, 2 pl., 1950.

In further studies at East Malling on raspberry mosaic [cf. *R.A.M.*, 19, p. 293; 28, p. 509; 29, p. 220], a disease distinct from mosaic 2 was identified in two of three cultures of Lloyd George derived from a single symptomless selection and tested with Baumforth's B indicators. In 1944 the canes on the infected indicator plants were more numerous than on the controls, the internodes were shortened and the plants slightly reduced in vigour. The most conspicuous symptom was a downward curling of the leaves varying in intensity in different plants. In 1945 these symptoms were more pronounced. The name 'curly dwarf' [ibid., 27, p. 246] is proposed for this disease.

From tests of a stock of Norfolk Giant it was concluded that this variety is a sensitive indicator of mosaic 2. Malling Seedling B was confirmed to be totally infected with mosaic 2 but in grafting experiments neither this variety nor Malling Landmark developed diagnostic symptoms of this disease. A stock of Red Cross, previously known to be uniformly infected with mosaic 2, was found to have become partially infected with an additional and unidentified virus.

Reinking (O. A.). **Banana virus studies and observations made at Tawau, Semporna, Mostyn, and Sebatik Island, British North Borneo : suggested studies for investigations to clarify the Abacá bunchy-top relationship with the Banana virus complex.**—*Plant Dis. Reptr*, 34, 3, pp. 66–69, 1950. [Multilithed.]

The author noticed the following banana virus diseases during his inspection tour of British North Borneo [see above, p. 304]. Leaf symptoms of (?) mosaic [? strain of cucumber mosaic virus: *R.A.M.*, 28, p. 227] on banana and *Commelina nudiflora* resembled those described from Brazil [ibid., 21, p. 87]. The older plants in the stools had collapsed and succumbed to an [unspecified] bacterial rot. (?) Infectious chlorosis [? strain of cucumber mosaic virus: ibid., 13, p. 250; 28, p. 130] is more like mosaic of abaca as found in Davao, Philippine Islands [ibid., 20, p. 65; 29, p. 153], than any other trouble observed on bananas. A disease closely resembling abaca bunchy top [loc. cit.] is described. The need for transmission experiments to establish the identity of the various viruses is stressed, and suggestions for further investigations are given.

Jacques-Félix (H.). **Discussion sur la fasciation de l'Ananas.** [Discussion on fasciation in Pineapple.] —*Fruits d'Outre-Mer*, 5, 2, pp. 39–50, 18 figs., 1950.

Different types of fasciation in pineapples are described. They comprise two conditions which may occur in juxtaposition or be superimposed on one another on the same plant: (*a*) fusion of adjacent axes in normal or abnormal numbers, and (*b*) hypergenesis, or abnormal increase in the number of axes. Factors inducing hypergenesis may be mechanical, physical, chemical, genetic, or pathological. Fungus and virus diseases may play a part in those cases where they affect the properties of the auxins, while saprophytes temporarily infecting lesions may also be involved.

Ziegler (A. W.). **A note on Inonotus amplectens Murrill.**—*Mycologia*, 41, 6, pp. 702–703, 1949.

Inonotus amplectens [cf. *R.A.M.*, 9, p. 753; 25, p. 143; 28, p. 361] was found growing in quantity on living twigs of the papaw, *Asimina parviflora*, along the banks of the Ochlocknee River, Florida, in July, 1949. There were one to four fruiting bodies per plant. It had not previously been seen in the neighbourhood.

McKnight (T.) & Everist (S. L.). **Phyllody in the Papaw.**—*Qd J. agric. Sci.*, 5, 4, pp. 149–152, 2 figs., 1948. [Received March, 1950.]

In a papaw plant affected by yellow crinkle virus [*R.A.M.*, 28, p. 132; 29, p. 36] all the flower parts are green and there is usually enlargement of the calyx lobes, though not of the calyx tube. In severe cases the sepals and petals are markedly divergent, leaf-like, and linear to linear-spathulate, the former with a prominent white midrib. Both have conspicuous reticulate veins, often pink to red. The calyx lobes may be up to 6 cm. long and undulate at the margins. The ovary is generally small and pale green to leaf-green, and the stigma a small white or pale-cream coloured branched structure under 0·1 cm. long; the ovary often develops unevenly and is irregularly ovoid, with an eccentric style. Occasionally the carpels become foliaceous, and in the extreme condition they develop into leaves all arising, apparently, in one plane, with a hollow petiole up to 6 cm. long and a peltate, virtually undivided lamina. In one flower the receptacle resembled a normal growing point with the young leaves rising in a spiral. Between this condition and that found in most affected flowers various degrees of fusion may be present in the petioles of the carpellary leaves. When phyllody of the carpels is well developed the blade may be cupped upwards, sometimes blistered or bullate, the veins slightly raised, and the main vein thickened and raised, following a finely zigzag path.

Cavill (G. W. K.) & Vincent (J. M.). **The fungistatic properties of *p*-aminobenzoic acid and related compounds. Part II. Relative fungistatic activity.**—*J. Soc. chem. Ind., Lond.*, 68, 6, pp. 189–192, 3 graphs, 1949.

The fungistatic activity of the methyl to *n*-amyl *p*-aminobenzoates and of the *ortho*-, *meta*-, and *para*-aminobenzoic acids and their methyl esters [*R.A.M.*, 28, p. 296] was determined by their inhibitory effect on the growth rates of *Aspergillus niger*, *Byssochlamys fulva*, and *Penicillium roqueforti*. On the basis of I_{50} values there is a general increase in activity from the methyl to the amyl *p*-aminobenzoate; the *meta* isomer is markedly less effective than the corresponding *ortho* or *para* compound. With *B. fulva* adsorption seems to permit a useful analysis of ester activity, particularly in terms of increasing biological adsorbability. The esters tested against *A. niger* do not present the same clear-cut picture. With both *B. fulva* and *A. niger* the low I_{50} values of the *meta* isomer may be explained on the basis of adsorption.

Boughey (A. S.). **The ecology of fungi which cause economic plant diseases.**—*Trans. Brit. mycol. Soc.*, 32, 2, pp. 179–189, 2 graphs, 1949.

After stating that the difficulties inherent in a synecological study of fungi may to some extent be avoided by considering only those fungi which cause diseases of cultivated plants, the author points out that environment influences a parasitic fungus strongly only at certain phases of its existence. The phases will be during long- and short-distance dispersal and during periods of out-of-season survival. It is when rapid, local dissemination is taking place that environment exerts its greatest effect.

Information on the conditions influencing spore production, dispersal, longevity, and germination in the downy and powdery mildews, Pyrenomycetes, Fungi Imperfecti, smuts, rusts, and Hymenomycetes is reviewed from the literature. Each of these major taxonomic groups exhibits within itself a remarkable uniformity in its methods of short-distance dissemination [*R.A.M.*, 27, p. 190]. It appears that successful infection of the host depends on much the same moisture conditions as those which induce optimum spore production and germination, and, consequently, epidemics. Some degree of correlation, therefore, may be expected between rainfall and the geographical distribution of economic plant diseases [loc. cit.] For example, downy mildews tend to increase with increasing rainfall, while rusts first decrease then increase. Regional Scottish records [ibid., 21, p. 439] show much the same trends as the Sudanese [ibid., 27, p. 190], with the addition that the smuts and Pyrenomycetes also appear to decrease with increasing rainfall. The same general trends were also discerned when plant disease lists for scattered countries from fairly uniform areas were analysed, namely, Egypt, Morocco, Mauritius, Tanganyika, Britain, Bombay Province, and Connecticut. These facts lend considerable support to the view that a real relationship exists between the annual rainfall of a given area and the proportion of fungal pathogens in each of the seven major groups. This proportion may be calculated from the annual rainfall alone. Thus a temperate area such as the Solway-Clyde part of Scotland may have much the same group representation as an island like Mauritius, which has something approaching the same mean annual rainfall in its agricultural areas. Given the rainfall to group-distribution relation, it becomes possible to construct a typical profile for an arid area and for a very wet area. The arid profile is characterized by a great predominance of powdery mildews, a fair representation of rusts, smuts, and Fungi Imperfecti, and low numbers of downy mildews, Pyrenomycetes, Hymenomycetes, and miscellaneous fungi. The wet profile has a very high percentage of Fungi Imperfecti, increased representation of downy mildews, Pyrenomycetes, and miscellaneous fungi, lower number of powdery mildews, rusts, and smuts, and again low figures for Hymenomycetes.

The highest proportion of seed-borne diseases of economic plants belongs to the Fungi Imperfecti, which is most strongly represented in wet areas; seed production, therefore, should be concentrated in the driest part of a country. Overhead irrigation in an otherwise dry area may encourage troublesome diseases not normally present. Where this method must be used, a fungicide might be added to the water. Greenhouse watering should be arranged, as far as possible, to avoid wetting the foliage. The usefulness of lists of economic plant diseases would be much increased if the records were listed in districts showing some uniformity, and if diseases not present were also reported.

Moore (W. C.) & Moore (F. Joan). **New and interesting plant diseases.**—*Trans. Brit. mycol. Soc.*, 32, 3–4, pp. 273–279, 1949.

During September, 1947, *Leveillula* [*Oidiopsis*] *taurica* was reported for the first time in the British Isles on leaves of a seedling rock rose (*Helianthemum vulgare*) and later on several other varieties of *H. vulgare* at Harpenden, Exmouth, Luton, and Exeter, and on *H. rhodanthe carnea* near Reading. Both the conidial state and mature cleistocarps with ripe ascospores developed. The occurrence of this fungus in widely separated southern districts of England during 1947 may have been due to the hot, dry summer.

In October, 1947, *Peronospora leptoclada* [*R.A.M.*, 3, p. 241] was identified on the lower surfaces of leaves of seedling rock roses at Bloxham. The conidia measured 18 to 27 by 18 to 21 (average 24 by 19) μ.

An *Oidium* attacking a hedge of cherry laurel (*Prunus lauro cerasus*) was observed at Cardiff in July, 1937, and again at Cardiff and at Usk (Monmouthshire) in September, 1938. The mildewed leaves were twisted and ruffled, the upper surfaces showing indefinite chlorotic areas which made the affected hedges conspicuous. The lower sides of the leaves were partly covered with sparse white or pinkish white mycelium. The conidia measured 30 to 41 by 12 to 17 (average 34 by 15) μ.

In August, 1947, at Feering, Essex, a disease progressed rapidly through a field of *Godetia* plants, particularly Sybil Sherwood and Kelvedon Glory. The stems were blackened by a coating consisting chiefly of the conidiophores and conidia of a species of *Alternaria*, identified as *A. godetiae* [ibid., 25, pp. 383, 580], while *Botrytis cinerea* was fruiting on the seed pods, buds, and petal remains, and *Diplodina passerinii* [ibid., 20, p. 468] was present on some plants. Of 30 seeds from withered plants germinated on moist filter paper five failed to grow and became covered with *Alternaria*. Two developed *B. cinerea* in addition. *Alternaria* developed on or was isolated from 20 seedlings while *B. cinerea* was found on seven and cultured from nine. Commercial seed samples from Feering developed *Alternaria* on 46 per cent. of the seeds from an obviously infected crop of Kelvedon Glory and 47 per cent. of Sybil Sherwood. The percentage of seedlings becoming infected was 33 and 40, respectively. The figures for a crop not obviously infected were 23 per cent. seeds and 23 per cent. seedlings of Kelvedon Glory with *Alternaria* and 27 and 24 per cent. of Sybil Sherwood. This is the first record of *A. godetiae* occurring outside Denmark.

Previous records of *Mycosphaerella citrullina* [*M. cucumis*: ibid., 28, p. 615] in this country [ibid., 1, p. 149] have been regarded as mistaken identifications. However, a portion of a diseased melon stem received from Hockley, Essex, in July, 1947, was found to bear a fungus closely resembling this pathogen. Mixed with the perithecia were several pycnidia-like bodies.

Martin (G. W.). **Outline of the fungi.**—iv+82 pp., 116 figs., Iowa, W. C. Brown Company, 1950.

This booklet, in its second edition, contains a classification with diagnostic keys

of the orders and families of fungi, including the Myxomycetes. Representative genera are listed in each case and species figured. There is a section on lichens and a glossary and bibliography.

Butler (Sir E. J.) & Jones (S. G.). **Plant pathology.**—xii+979 pp., 435 figs., London, Macmillan & Co. Ltd., 1949. £3. 3*s*. 0*d*. net.

This very comprehensive and excellently illustrated work, which will greatly assist University degree students and research workers in plant pathology, is a revision of Sir E. J. Butler's book 'Fungi and disease in plants', published in 1918, with the important plant diseases occurring in Great Britain and those common in other countries substituted in the second part for the tropical diseases. Except for the bibliographies and illustrations, the book was complete before the senior author's death in 1943. The plan remains much the same. Part I (339 pp.) was written mainly by the senior author and deals with General Principles. It contains chapters on the following subjects: the nature of disease organisms; the life-history of parasitic fungi; pathogenesis I: the parasite in relationship with its host; pathogenesis II: resistance and susceptibility; the influence of environmental and nutritional conditions on plant diseases; morbid anatomy and histology; the principles of the control of plant disease; virus diseases of plants; deficiency diseases of plants (the last two being dealt with in a general way); and an appendix giving the classification of the fungi.

Part II (609 pp.) is by S. G. Jones and deals with selected diseases, detailed descriptions being given of the more important diseases under the common host attacked. The descriptions of the causal organisms are given in smaller print. The eight chapters cover the various groups of cultivated plants, including ornamentals and forest trees. In the first part the bibliographies appear at the end of each chapter; in part II they follow each disease.

Westcott (Cynthia). **Plant disease handbook.**—xii+746 pp., 111 figs., New York, D. Van Nostrand Company, Inc., 1950. $7.50.

This semi-popular handbook, designed as a guide to both amateur and professional gardeners for the rapid identification of plant diseases, is a compendium of available information on the diseases of vegetable crops, ornamental plants, shrubs, and trees grown in gardens in the United States. After an introduction in which plant diseases are discussed in general, it comprises chapters on garden chemicals and their application; classification of plant pathogens; plant diseases and their pathogens; and host plants and their diseases.

Pflanzenschutz in Wechsel der Jahreszeiten. Ein Schädlingsbekämpfungs-Kalendar 1950. [Plant protection in the changing seasons. A pest control calendar 1950.]—120 pp., 7 col. pl. (1 on cover), 57 figs., 2 diags., 1 map, Mitteldeutsche Druckerei und Verlagsanstalt GMBH, 1950.

This useful publication, the first of a projected series sponsored by the Biological Institute, comprises detachable illustrations, one for each week of the year, of some important pests and diseases affecting economic plants in Germany, with notes by experts on the different subjects on their symptomatology and on the life-histories and control of the causal organisms.

Stevens (N. E.). **Disease damage in clonal and self-pollinated crops.**—*J. Amer. Soc. Agron.*, 40, 9, pp. 841–844, 1948. [Received February, 1950.]

Using two different sets of data [*R.A.M.*, 24, p. 513; 25, p. 406], the author discusses the extent to which vegetative propagation and genetic uniformity in a crop contribute to disease hazard [ibid., 29, p. 27]. From the first data the sum of disease indices for vegetatively propagated crops is 21·8, for those propagated by

seed (self-pollinated) 21, and for naturally cross-pollinated plants 9·6. Cotton, which is largely self-pollinated, rates at 8·4. From the second data the average number of virus diseases occurring on nine vegetatively propagated crops is computed as 6·3, on self-pollinated ones 5·2, and on cross-pollinated 3·4.

50 Jahre deutscher Pflanzenschutzforschung. Festschrift zum fünfzigjährigen Bestehen der Biologischen Zentralanstalt für Land- und Forstwirtschaft in Berlin-Dahlem. [Fifty years of German plant protection research. Anniversary publication to commemorate the 50 years' existence of the Biological Central Institute of Agriculture and Forestry in Berlin-Dahlem.]—232 pp., Berlin 0 17, Deutscher Zentralverlag GMBH, 1949.

Contributions to this commemorative publication issued to mark the 50th anniversary of the foundation of the Biological Central Institute of Agriculture and Forestry in Berlin-Dahlem [*R.A.M.*, 29, p. 164] include a survey of the scope and operations of the Institute from 1898 to 1948 by O. Schlumberger; a section on botany, comprising an introduction entitled 'Functions and objects of agricultural botany' by A. Hey, summaries of the available information on microbiology by H. Richter, the recognition and differentiation of botanical varieties by K. Snell, and plant virus research by H. Uschdraweit; studies on problems of immunity and resistance, including a general review, papers on potato wart (*Synchytrium endobioticum*) disease, potato degeneration, and various forms of chlorosis by H. Wartenberg, on potato blight (*Phytophthora infestans*) by M. Klinkowski, and on rusts (*Puccinia* spp.) by A. Hey; and the following papers dealing with plant-protectives and plant-protection equipment: functions and objects of the official evaluation of plant-protectives and plant-protection equipment; fungicides; and testing of plant-protectives, all by H. Müller; and chemical studies of plant-protectives by W. Fischer.

Batista (A. C.) & Lima (D. A.). **Lista de suscetíveis da alga Cephaleuros mycoidea Karst. em Pernambuco.** [List of hosts of the alga *Cephaleuros mycoidea* Karst. in Pernambuco.]—*Bol. Agric., Pernambuco*, 16, 1–2, pp. 32–46, 1949.

A list is given, arranged in alphabetical order of the common names, of 448 hosts of *Cephaleuros mycoidea* in Pernambuco, Brazil [cf. *R.A.M.*, 27, p. 226], where the alga is stated to occur on practically all cultivated plants and on a large number of wild ones and native forest trees.

Fennell (Dorothy I.), Raper (K. B.), & Flickinger (May H.). **Further investigations on the preservation of mold cultures.**—*Mycologia*, 42, 1, pp. 135–147, 1 fig., 1950.

This is a full account of information which has already been noticed from another source [*R.A.M.*, 28, p. 230].

Stebbins (Mary E.) & Robbins (W. J.). **Mineral oil and preservation of fungous cultures.**—*Mycologia*, 41, 6, pp. 632–636, 1949.

Of 1,959 fungus cultures preserved by the mineral oil method [*R.A.M.*, 27, p. 329] in March, 1947, all except nine were viable in January, 1949. Species of eight genera including *Corticium*, *Elsinoe*, and *Sphaceloma* grew better under oil. In general subcultures from oil appeared to grow more vigorously than transfers from cultures without oil.

Weston (W. H.). **Influence of the several steps of the lyophile process on survival of fungous spores.**—Abs. in *Amer. J. Bot.*, 36, 10, pp. 816–817, 1949.

Certain modifications of the lyophil process of preserving fungus spores [*R.A.M.*, 29, p. 165] developed at the Harvard Biological Laboratories, include dehydration of the distributed spore suspensions by preliminary evaporation from the liquid

state followed by final sublimation from the frozen state. This raised the germination percentage from below 15 to 30. Similar dehydration with spore suspensions in a mixture of sucrose and algin [instead of horse serum] raised it to 93 per cent.

Mazur (P.) & Weston (W. H.). **Effects of spray-drying on the viability of certain fungous spores.**—Abs. in *Amer. J. Bot.*, 36, 10, pp. 811–812, 1949.

The apparatus used in the spray-drying of fungus spores at the Harvard Biological Laboratories is described, and the effects on the viability of the spores discussed and compared with the effects of sublimation by the lyophil process [see preceding abstract]. The apparatus consists of an outer shell of glass tubing (through which air is drawn) around a smaller diameter tube in its centre in which a spore suspension is broken up into a fine spray. It passes into a large, partly evacuated, glass spray-drying chamber. The viability depended on the length of contact between the spores and the vacuum and also on the heat involved in the spray-drying. There were significantly higher percentages of germination with this method than with the lyophil process.

Smith (G.). **The effect of adding trace elements to Czapek-Dox medium.**—*Trans. Brit. mycol. Soc.*, 32, 3–4, pp. 280–283, 1949.

Experiments were carried out at the London School of Hygiene and Tropical Medicine to determine the effect on the growth of *Penicillium* species of adding trace elements to Czapek-Dox agar medium. The species grew atypically on the usual medium when made up with copper-free distilled water. Satisfactory growth and sporulation were obtained with the addition of 0·0005 per cent. copper sulphate and 0·001 per cent. zinc sulphate. The addition of copper and zinc also stimulated the production of citromycetin in *P. glabrum* up to 17 times the amount produced in a Czapek-Dox glucose medium, and increased citrinin production by *P. implicatum*.

Sansome (Eva R.). **Spontaneous mutation in standard and 'gigas' forms of Penicillium notatum strain 1249 B21.**—*Trans. Brit. mycol. Soc.*, 32, 3–4, pp. 305–314, 1 pl., 1 fig., 1949.

In experiments carried out in the Department of Cryptogamic Botany, Manchester University, spontaneous mutation was studied in standard and *gigas* forms of *Penicillium notatum* strain 1249 B21. Three *gigas* forms, with conidia 4·2 μ in diameter and larger nuclei and presumed to be diploid, were obtained, two in cultures treated with small quantities of dextrorotatory camphor and one from a control series not so treated. The *gigas* forms produced a mutant type, dark 1, identical with that given by the parent, but in two steps with an intermediate type presumed to be heterozygous. The proportions in which these types were recovered are consistent with the hypothesis that the *gigas* form is diploid. The intermediate *gigas* dark gave some paler types, some of which were apparently identical with the original *gigas*. This is considered to represent a cross-over.

The *gigas* forms are considered to be diploid because the camphor treatment has also been known to cause chromosome doubling in yeasts [*R.A.M.*, 23, p. 72] and higher plants [ibid., 20, p. 548], and the difference in diameter of the conidia (1·4:1) is of the order to be expected if the original type is haploid and the *gigas* diploid. The graduated mutation pattern also gives strong genetical evidence in favour of this hypothesis.

Heim (R.), Souvel (J.), & Saccas (A.). **Sur un nouveau Penicillium à haut pouvoir antibiotique.** [On a new *Penicillium* of high antibiotic potency.]—*Bull. Cl. Sci. Acad. Belge.*, Sér. 5, 35, 1, pp. 42–49, 8 figs., 1 graph, 1949.

A new species of *Penicillium* is described [without a Latin diagnosis] under the

name of *P. camerunense*, which exerted a powerful antibiotic action on accidentally contaminated cultures of *Thielaviopsis* [*Ceratostomella*] *paradoxa*, isolated from oil palm roots [*R.A.M.*, 11, p. 769] in the Cameroons in 1946. In other tests it exhibited marked antagonism towards a number of different fungi, including *Botryodiplodia theobromae*, *Sepedonium chartarum* (isolated from paper by A. Saccas), *Aspergillus tamarii* [ibid., 26, p. 299], and *Coriolus* [*Polystictus*] *versicolor*, as well as various strains of *Streptococcus* and *Staphylococcus*. The conidia of *P. camerunense* measure 2 to 4 by 2 to 3·5 (average 3 by 2·4) μ and are borne on profusely branched conidiophores with three or four phialides, 8 to 10 by 5 to 7 μ.

Haskins (R. H.). **Fermentation studies of Ustilago spp.**—Abs. in *Amer. J. Bot.*, 36, 10, pp. 809–810, 1949.

At the Prairie Regional Laboratory, Saskatoon, Saskatchewan, it was found that species of *Ustilago* produced relatively large yields of fats, sterols, and at least two stable, fat-soluble antibiotic compounds, temporarily designated as 'Ustilagin A', and 'Ustilagin B'. One of the antibiotics is strongly active against Gram-positive and Gram-negative bacteria, the other against many fungi, including both the *flavus* and *niger* groups of *Aspergillus*, some *Penicillium* spp., and many Fungi Imperfecti.

Duckworth (R. B.) & Harris (G. C. M.). **The morphology of Penicillium chrysogenum in submerged fermentations.**—*Trans. Brit. mycol. Soc.*, 32, 3–4, pp. 224–235, 2 pl., 9 figs., 1 graph, 1949.

At the Imperial Chemical Industries Biological Laboratories, Manchester, conidia in shaken, liquid cultures of *Penicillium chrysogenum* Q 176 [*R.A.M.*, 28, p. 348] usually germinated between the fourth and twelfth hours to produce branched hyphae which became progressively narrower. About 5 per cent. germinated later to form abnormally wide hyphae, usually with swollen tips. When these colonies, not over 48 hours old, were transferred to the penicillin fermentation flasks the narrow hyphae rapidly produced numerous side branches which soon filled the medium. Within a few hours they died rapidly. Meanwhile, the wide hyphae had formed spherical bodies which, at this stage, proliferated and formed a second 'generation' of mycelium. Further fluctuations in the amount of living material followed until after eight days the culture finally degenerated.

In future work it is hoped to examine the effect of environmental conditions on the morphology of agitated cultures of the *P. notatum-chrysogenum* group. When this information is available it may be possible to define, by morphological examination, the conditions under which cultures have been grown and to correlate microscopic appearance with biochemical behaviour.

Vischer (E. B.), Howland (S. R.), & Raudnitz (H.). **Viridin.**—*Nature, Lond.*, 165, 4196, p. 528, 1950.

A procedure for the isolation (from *Trichoderma viride*) and purification of viridin, an antibiotic active against *Botrytis allii* [*R.A.M.*, 26, p. 23], is described. It gives good yields of the antibiotic and reproducible results.

Kenchington (K. W. L.). **The microbiological deterioration of cellulosic textiles—I, II.**—*Fibres*, 9, 9, pp. 348–350; 11, pp. 433–436, 1948.

This useful survey of the available information on the microbiological deterioration of cellulosic textiles is presented under the headings of divisions and classifications of fungi; physiology of fungi; food and light requirements; fungal activity; mildew attack; microscopic study; constitution of 'cellulosic' textiles; copper preservatives; other metal treatments; organic treatments; and assessment of rot-proofing efficiency.

Partridge (H. W.) & Key (G. E.). **Rotproofing.**—*J. Text. Inst., Manchr,* 40, 12, pp. P1077–P1089, 4 pl., 1949.

Following a discussion on the various methods and agents used in the rot-proofing of textiles, the writers describe and tabulate the results of experiments with a process involving the combination of a phenolic compound with a quaternary ammonium salt. In burial tests covering an eight-week period from May to July, there was no loss in tensile strength [*R.A.M.*, 28, p. 583] of samples of scoured, unbleached cotton fabric treated with shirlan (2 gm. per l.) followed by cetyl pyridinium bromide (the most effective cationic agent so far investigated) at the same rate (two-bath application) compared with 100 per cent. for shirlan alone and pentachlorophenol alone (both at 10 gm. per l.) and untreated, and 29 per cent. for 1 per cent. copper naphthenate. In a further series of burial tests (July to September), the reduction of shirlan and pentachlorophenol to 0·6 gm. per l., followed in each case by 2·5 gm. cetyl pyridinium bromide, resulted in losses of strength after ten weeks of 87 and 48 per cent., respectively, the corresponding figures for shirlan alone, cetyl pyridinium bromide alone, and 1 per cent. chromium oxide being 100 per cent. and for 1 per cent. copper naphthenate 77 per cent. The use of a single bath is also feasible, provided a sufficient excess of the cation-active agent is used to disperse the insoluble complex formed with the phenol. There was no loss of strength after ten weeks in samples treated with 10 gm. shirlan per l. plus 32 gm. cetyl pyridinium bromide or 10 gm. pentachlorophenol plus 40 gm. cetyl pyridinium bromide in the July to September series of burial tests. In 16-week spring burial tests the loss of strength in cotton, linen, jute, and hemp samples treated with 1 per cent. copper naphthenate was 71, 56, 15, and 0 per cent., respectively; with 5 gm. per l. cetyl pyridinium bromide followed by 2 gm. shirlan 53, 61, 3, and 0; with the same compounds in the reverse order 35, 44, 0, and 0; and controls all 100 per cent.

Another series of tests was carried out by the incubation technique, samples of yarn or fabric being wound on Berkefeld filter-candles coated with soil–horse manure inoculum or sprayed with an aqueous suspension of mixed cultures of *Aspergillus niger*, *A. amstelodami*, *Penicillium brevi-compactum*, *Paecilomyces varioti*, *Chaetomium globosum*, and *Stachybotrys atra*, and incubated at 30° C. and about 100 per cent. relative humidity. The results were in general agreement with those of the soil burial tests. Thus, after 89 days samples of American and Egyptian cotton tape (for use in the electrical trade) treated with 2 gm. cetyl pyridinium bromide per l. followed by 1 gm. shirlan and rinsing, were free from mould growth, in comparison with various other treatments. In another test, samples of a light, unmercerized, plain cotton were mould-free at the end of 76 days' incubation after treatment with 1½ gm. shirlan per l. followed by 3 gm. cetyl pyridinium bromide or vice versa and two hours' leaching in cold running water. Pieces of worsted given the foregoing treatment of shirlan and cetyl pyridinium bromide showed merely slight traces of mould growth after 92 days, while those only scoured were completely rotten and those scoured and treated with shirlan heavily coated with mildew growth. In the case of silk, the combination of shirlan and cetyl pyridinium bromide entirely prevented mould development, which was heavy on the pieces scoured only or treated with shirlan after scouring. Other tests showed that the complexes can be incorporated in maize starch and maize dextrin sizes, in which form they are eminently suitable for use in the preparation of polished yarns for the covering of electric wires. They were also shown to be resistant to leaching in hot or even boiling water for one hour.

Ames (L. M.). **New cellulose destroying fungi isolated from military material and equipment.**—*Mycologia,* 41, 6, pp. 637–648, 42 figs., 1949.

The following species of *Chaetomium* were isolated from rotting materials [cf.

R.A.M., 27, pp. 330, 487; 28, pp. 298, 584, 585]. *C. turgidospilum* n.sp., from a storage tent, is characterized by soiled grey perithecia, 120 to 140 by 115 to 135 μ, with conspicuous cirrhi and delicate rhizoids. The asci measure 20 to 22 by 9·5 to 11·5 μ (spore part 15 μ). The brown, lemon-shaped ascospores measure 8 to 11 by 4·7 μ and are somewhat apiculated at both ends. The fungus is easily recognized by the inflated terminal hairs, reflexed at the tips.

C. cristatum n.sp., from paper carton at Fort Belvoir, Virginia, has grey perithecia, 250 to 300 by 175 to 225 μ, with pale brown rhizoids. The asci measure 45 by 12 μ (spore part 28 μ); the umbonate to subapiculate, olive brown ascospores measure 8 to 12 by 4·5 to 6 μ. The terminal hairs are either numerous and branched, or long, black, and sparse, sometimes anastomosing at the abruptly frayed tips.

C. gangligerum n.sp., from wood samples at Fort Belvoir, has tawny yellow perithecia, 230 to 260 by 190 to 210 μ, without cirrhi, but with numerous rhizoids. Hairs are numerous, the lateral ones septate and the terminal ones coated with barbules and tawny yellow. The asci measure 50 by 18 μ (spore part 36 μ). The mature ascospores are brown, ovate to globose-ovate, umbonate to subapiculate, and 12 to 18 by 7 to 11 μ. In potato plus maize mineral agar, characteristic dark-celled bulbils are produced.

C. velutinum n.sp. from a Japanese tent, has silver grey perithecia 150 to 180 by 120 to 140 μ, producing occasional cirrhi and numerous rhizoids. The terminal hairs are covered with little spines and have a coiled apex. The cylindrical asci measure 65 by 7 μ (spore part 38 to 42 μ), and the mature monostichous ascospores are dilute olive brown, lemon-shaped, umbonate to subapiculate, and 6·75 to 8·5 by 4 to 6 μ.

C. atrobrunneum n.sp. from a mouldy mattress on Guadalcanal has dark brown perithecia, 80 to 120 by 80 to 110 μ, with cirrhi or with spore masses loosely held in the terminal hairs, and with straw-coloured rhizoids. The asci measure 30 by 10 μ (spore part 18 μ). The mature ascopores are dilute olive brown, somewhat fusiform, rounded to subacute on the ends, and 10 to 12 by 5·5 to 7·5 μ. The species is readily distinguished by the rich brown terminal hairs, branched at wide angles.

C. seminudum n.sp. has black, vase-shaped perithecia, 150 by 70 (100 to 165 by 60 to 85) μ, with long cirrhi and translucent, mycelium-like rhizoids. Lateral and terminal hairs are alike and few. The spores are pale olive brown, globose-ovate, with rotund to subacute ends, and 13·5 by 11 (9 to 14 by 7 to 8) μ. In agar media plus potato and maize extract, myriads of chlamydospore-like bodies, 10 to 15 μ in diameter, are produced, mostly on the ends of stalks, 30 to 50 by 2 μ, though some are intercalary.

C. cupreum n.sp., from rotting material from the Panama Canal Zone and Garada Canal has bright copper-coloured perithecia, 110 to 120 by 120 to 130 μ, with conspicuous cirrhi and undifferentiated rhizoids. The lateral and terminal hairs are covered with copper-coloured grains. The asci measure 38 by 13 μ (spore part 27 μ), and the globose-ovate, subapiculate ascospores are 10 by 5·5 (8·5 to 11·5 by 5 to 5·5) μ.

C. causiaeformis n.sp. is characterized by delicate, translucent perithecia, 80 to 100 by 80 to 90 μ, without cirrhi, but with numerous rhizoids lightly attached to the substratum. The terminal hairs are either short and branched, clustering closely around the ostiole, or long, undulating, and unbranched and covered with very small barbules. The asci measure 23 by 8 μ (spore part 18 μ). The ascospores are dilute brown, ovate to subglobose, and 5 by 4 (4·75 to 5·25 by 3 to 4·5) μ.

C. succineum n.sp. has perithecia 225 to 350 by 140 to 230 μ, frequently with cirrhi and delicate rhizoids. The asci are 35 by 15 μ, (spore part 27 μ). The ascospores are pale olive brown, globose-ovate, rounded to subacute at the ends, and 14 by 7·5 (12 to 15 by 7 to 8) μ. This species is distinguished by the loose cluster of slender, amber-coloured hairs ornamenting the apex of the perithecium.

Gadd (G. O.). **Slipmassans torrhalt och möglingsfaran.** [The dry matter content of groundwood pulp and the danger of mould development.]—*Norsk Skogind.*, 2, 7, pp. 179–182, 2 graphs, 1948. [English summary.]

An account is given of experiments in Finland, at the Central Laboratory, Helsingfors Biochemical Department, which demonstrated the absence of moulds from mechanical pulp [see next abstracts] which is 75 per cent. air-dry. Below 70 per cent. (at which there is also very little damage from this source) fungal growth (predominantly *Pullularia pullulans*) [*R.A.M.*, 27, p. 211 *et passim*] is profuse, apparently owing to the 100 per cent. relative humidity of the air between the sheets in a bale in such cases.

Drying exerted little effect on the strength of the pulp under favourable conditions (30 per cent. relative humidity and a temperature of 85° C.), the maximum reduction being 3 per cent. The breaking-up of the pulp, however, presented increasing difficulties with drying above 70 per cent. During six months' storage all the samples, including the air-dry pulp, had changed to such an extent that the time required for breaking it up was 50 minutes or more compared with 5 to 8 minutes at 60 per cent. dryness and 20 at 90 per cent. before storage [cf. ibid., 28, p. 607]. Hyphal penetration of the moist samples during storage increased the difficulty of defibration.

Gadd (G. O.). **Fungal damages in groundwood pulp.**—*Pulp Pap.* (*Mag.*) *Can.*, 50, 11, pp. 98–99, 1949.

Some of the information presented in this report from the Research Institute of the Finnish Woodworking Helsingfors Industries [cf. preceding abstract] has already been noticed from other sources, but the following data may be of interest. After four months' storage at room temperature the colour of groundwood pulp inoculated with *Coniophora cerebella* [*C. puteana*] was light brown, the pH of the rot stain 3·3 (compared with 5·7 in the normal samples), and the decrease in weight per sq. m. 7·5 per cent.; with *Polystictus abietinus* dark brown, pH 4·4, and weight reduction 3·1 per cent.; with *Lentinus lepideus* yellow-white, pH 3·6, and 4·2 per cent., respectively; with *Lenzites sepiaria* yellow-white, pH 3·9, and 10·2 per cent.; with *Fomes annosus* brown, pH 5·2, and 18·4 per cent.; and with *Stereum sanguinolentum* brown, pH 4·6, and 5·4 per cent. The acidity and colour changes develop simultaneously after a relatively short period of storage. It is clear from these figures that the loss in weight due to rotting after four months' storage is in most cases fairly small, and in mill practice it has been found that the decayed pulp can be used without impairing the strength of the paper. After two years' storage, however, an inoculated sample of groundwood pulp lost 40 per cent. of its original weight and the fibre structure was totally destroyed.

Buckman (S. J.). **Microorganism control in mechanical pulp and its relation to paper manufacture.**—*Paper Tr. J.*, Tech. Sect., 32, 3, pp. 129–144, 7 figs., 1 diag., 1949.

Information is presented in support of the conclusion, based on experimental data obtained in co-operative tests at the Lulea (Sweden) timber factory, that the growth of micro-organisms (including a species of *Penicillium* producing a pale violet stain and *Aspergillus niger*) in wet mechanical pulp (50 per cent. moisture content) [cf. preceding and next abstracts] can be economically controlled for a storage period of upwards of a year by treatment with BSM—11B, a 10 per cent. solution of phenylmercuric acetate, added to the white water with the system closed. Slime control was achieved throughout the pulp system by the combined effect of the treatment and operation at a temperature of 55° C. [cf. *R.A.M.*, 28, p. 321]. The primary object of micro-organism control is the protection of pulp stored as slush stock in tanks, and as wet sheet or lap stock. The loss of fibre

in badly decayed pulp [see preceding abstract], the difficulty of dispersing partially rotted material, and the odour and darkening of colour caused by microbiological growth are all factors which cannot be ignored, but the major losses result from the contribution of the infection in the pulp to slime development throughout the paper machine systems. A method for the determination of mercury in wood pulp is described in an appendix.

CRUICKSHANK (G. A.). **Evaluation of mold-resisting treatment of paper and paperboard.**—*Paper Tr. J.*, Tech. Sect., 32, 8, pp. 370–374, 5 figs., 1949.

Data are presented indicating that the agar plate method commonly used for the assessment of the mould-resisting qualities of paper and paperboard [*R.A.M.*, 26, p. 254] may be unsatisfactory for tests on light-weight paper. Thus, changes in the paper-to-agar weight ratio may yield results with a range of interpretation varying between effective mould resistance and no apparent protection. Further, the choice of the test organism, the pH of the culture medium, and the length of the incubation period may exert a similar effect on the evaluation of the treatments. The various factors are discussed in detail and suggestions made for the elimination of the foregoing variables.

Using *Aspergillus versicolor* as the test organism and pentachlorophenol as the fungicide, satisfactory results for evaluating papers of the thicknesses indicated were given by the following amounts of Sabouraud's dextrose agar (in ml.); up to 0·01 in., 5; 0·011 to 0·015 in., 10; 0·016 to 0·02 in., 15; 0·021 to 0·025 in., 20; 0·026 to 0·03 in., 25; 0·031 to 0·035 in., 30; 0·036 to 0·04 in., 35; and 0·041 in. and upwards, 40. In comparative tests with *A. niger* and *A. versicolor*, no significant differences in growth were observed at pH levels between 6·9 and 8·9. Below pH 6·9, however, there was a progressively decreasing abundance, the growth of *A. niger* being completely inhibited at 5·9 and that of *A. versicolor* appreciably reduced. *A. niger* has frequently been used as a criterion for the efficiency of antimycotic treatments, yet these experiments have shown that *A. versicolor* is capable of development under conditions entirely precluding the growth of the former species. Since modern fungicidal treatment in the paper industry is largely carried out with chlorinated phenols, which are most effectively applied under acid conditions, the use of an acid medium, such as Sabouraud's agar (pH 5·5 to 5·6), is recommended. An incubation period of seven days appears to give equally reliable results with one of three weeks.

A mode of inoculation developed in the course of this work seems to offer certain advantages over that of spreading 1 ml. of a spore suspension of the test moulds over the surface of the square of paper. It consists in streaking the spores in one line diametrically across the square from the edge of the Petri dish, then picking up a second inoculum of spores and streaking another line at right angles to the first.

BORTELS (H.). **Mikrobiologischer Beitrag zur Klärung der Ursachenfrage in der Meteorobiologie.** [A microbiological contribution to the elucidation of the problem of causation in meteorobiology.]—*Arch. Mikrobiol.*, 14, 3, pp. 450–508, 2 figs, 2 diags., 27 graphs, 1949.

This is an exhaustive explanation and discussion, supported by experimental evidence, using as the test organisms various bacteria, including *Pseudomonas* [*Bacterium*] *tumefaciens*, yeasts, and *Aspergillus niger*, of the author's theory that the active principle of meteorobiological reactions [*R.A.M.*, 29, p. 12] is a so-called 'weather radiation', consisting of soft and hard rays, of which the former appear to be operative in low, and the latter in high pressure areas. The soft rays are thought to promote biological reduction processes, fermentations, aggregations, and growth, and to inhibit biological oxidations, aerobic respiration, and processes of sexual reproduction. The inhibition of aerobic respiration under the progressive

influence of soft radiation is naturally accompanied by a fall in the 'economic [respiratory] quotient' and a repression of mass growth. The hard rays appear to act in the opposite direction or not at all. Hermetically sealed cultures of *Bact. tumefaciens* reacted to meteorological influences in the same way as open ones.

Gilpatrick (J. D.) & Henry (A. W.). **The effect of nutritional factors on the development of Ophiobolus graminis Sacc.**—Abs. in *Proc. Canad. phytopath. Soc.*, 17, p. 14, 1950.

Studies on the nutrition of *Ophiobolus graminis* conducted at the University of Alberta confirmed that biotin is necessary for its early growth and thiamine for further mycelial development [cf. *R.A.M.*, 28, p. 452]. Concentrations of 100 μg. biotin and 10,000 μg. thiamine per l. of basic nutrient solution were optimal for mycelial development. Aspartic acid could replace biotin as a growth substance. Growth was reduced considerably by diluting nutrients at constant vitamin concentrations. Maltose was the best carbohydrate source. Two per cent. dextrose was optimum, but a wide range of concentrations was satisfactory. Peptone and asparagine proved the best sources of nitrogen of the substances tested. D-glutamic acid was more effective than twelve other amino acids, single or mixed. Perithecia failed to develop in any medium, but small, black, sterile bodies, similar in size and shape, were formed when high concentrations of biotin, thiamine, and other nutrients were used, and with sodium nitrate or *dl*-serine as a nitrogen source.

Elliott (E. S.). **The effect of the sugar concentration on conidial size of some species of Helminthosporium.**—*Phytopathology*, 39, 12, pp. 953–958, 1 graph, 1949.

At the West Virginia Agricultural Experiment Station the effect of the sugar concentration in the substratum on the size of the conidia of *Helminthosporium victoriae* [*R.A.M.*, 26, p. 99], *H. sativum*, *H. turcicum*, *H. oryzae* [*Ophiobolus miyabeanus*: ibid., 26, p. 533], and *H. sigmoideum* var. *irregulare* [ibid., 20, p. 423] was investigated. The media used were malt extract, Leonian and Lilly's glucose-casein hydrolysate (*Bull. W. Va agric. Exp. Sta.* 319, 1945), and glucose-nitrate.

Within limits, the length was inversely proportional to the amount of sugar available to the fungus. The numbers of cells in the conidia were generally found to be directly proportional to spore length. *H. victoriae* produced conidia of maximum (56 μ) and minimum (25·8 μ) average length on media containing 0·03 and 2 per cent. sugar, respectively. *H. sativum* produced conidia of maximum and minimum average length on media with 0·12 per cent. and 2 per cent. sugar contents, respectively. Not until the sugar content exceeded 4 per cent. was there any appreciable decrease in the average conidial dimensions of *O. miyabeanus*. The average length of the small, relatively uniform conidia of *H. sigmoideum* var. *irregulare* [ibid., 26, p. 416], did not vary greatly with the sugar content of the medium, but the general trend was similar to the foregoing. The data obtained in the tests with *H. turcicum* were inconclusive.

Lopatecki (L. E.). **The nutrition of Phytophthora species.**—Abs. in *Proc. Canad. phytopath. Soc.*, 17, pp. 13–14, 1950.

In nutritional experiments at Saanichton, British Columbia, the growth of *Phytophthora cactorum* was greater with ammonium than with nitrate while the latter encouraged the greater growth of *P. parasitica*, *P. erythroseptica*, and *P. megasperma*. Optimum concentrations of glucose and sucrose were 4 per cent. for all species. For each species the economic coefficient was independent of both sugar and thiamine concentrations. The growth of *P. parasitica* in 1 per cent. alanine medium bore a linear relationship to thiamine concentration between 0·1 and 0·6 mg. per l.; the range was smaller at lower alanine concentrations. The ratio

of carbon to nitrogen utilized by *P. parasitica* increased with the thiamine content of the media, resulting in a progressive decrease in the nitrogen content of the mycelium.

MacLeod (D. J.). **Further observations on the bunch-top (purple-top) disease of Potatoes.**—Abs. in *Proc. Canad. phytopath. Soc.*, 17, pp. 10–11, 1950.

When potato tubers infected with bunch-top or purple-top wilt (? caused by a strain of aster yellows virus) [*R.A.M.*, 28, p. 480] are planted, some of the eyes fail to germinate, a few produce weak, spindling sprouts which collapse in a few days, and others give rise to dwarfed stems with enlarged nodes, axillary shoots with swollen bases, and sometimes aerial tubers. Leaflets are rolled and have yellow or purple margins. In the first season the symptoms vary considerably. Some varieties exhibit the symptoms described, others exhibit no definite discoloration except for a slight chlorosis of the apical leaves.

The bunch-top virus also causes a disease in field-grown tomatoes characterized by dwarfing and rigidity of the plant and rolling and purpling of the leaves. It was also found in *Lycium halimifolium*, *Datura stramonium*, and tobacco in the field. A virus resembling bunch-top was recovered from milkweed (*Asclepias syriaca*).

Andrade (A. C.) & Moreira Salles (J.). **Pulverização da Batatinha.** [Potato spraying.]—*Biológico*, 15, 10, pp. 187–198, 1949.

Following some general observations on the fungicidal spraying of potatoes, primarily for the control of blight (*Phytophthora infestans*), under the headings of why, when, and how the operations should be carried out, the writers describe and tabulate the results of their experiments near Taubaté, Parahyba, Brazil, using combinations of Bordeaux mixture and parzate with the insecticides deenate (50 per cent. wettable DDT) and rhodiatox (diethyl-nitrophenyl thiophosphate). Four treatments were given, on 22nd July, 4th and 18th August, and 5th September, 1949.

An increase in yield of 32 per cent. over 1 per cent. Bordeaux mixture and 11·5 per cent. over 0·25 per cent. parzate was obtained with a mixture of rhodiatox (1 in 5,000) and parzate. The insecticide appears to mix less well with Bordeaux mixture, the combination resulting in an increase of only 0·14 per cent. over Bordeaux alone.

Kole (A. P.). **Over de invloed van fusarex op een aantasting door poederschurft (Spongospora subterranea (Wall.) Lagerheim).** [On the influence of fusarex on an attack of powdery scab (*Spongospora subterranea* (Wall.) Lagerheim).]—*Tijdschr. PlZiekt.*, 55, 6, pp. 308–311, 4 graphs, 1949. [English summary.]

At the Phytopathological Institute, Wageningen, Voran seed potatoes from the province of Drenthe, Holland, heavily infected with powdery scab (*Spongospora subterranea*) [*R.A.M.*, 26, p. 78], were treated on 25th November, 1948, with formalin, aretan (one minute's immersion in a 1 per cent. solution in both cases), and fusarex [ibid., 28, p. 140] dust (6 kg. per 1,000 kg.). Aretan proved superior to formalin in the control of the pathogen, but the incidence of infection of the spring-planted progeny was so slight, even in the untreated lots, that detailed observations on the relative merits of the two fungicides were impracticable. On the other hand, fusarex definitely increased the amount of powdery scab, possibly by stimulating the germination of the normally dormant resting spores [cf. ibid., 13, p. 599].

Starr (G. H.). **Potato ring-spot studies in 1947.**—Abs. in *J. Colo.-Wyo. Acad. Sci.*, 3, 6, p. 41, 1948.

Bliss Triumph potatoes inoculated in 1946 with a 1 in 1,000 dilution of *Corynebacterium michiganense* [*R.A.M.*, 28, p. 416] displayed no plant symptoms, nor

did any appear when these units were replanted in 1947. Stems from some of these hills carried the bacteria while others did not, although all had been inoculated in the same way two years before. Under Wyoming conditions, therefore, susceptible as well as resistant varieties may carry *C. sepedonicum* in trace amounts for a minimum period of two years without showing plant symptoms.

Burlap bags smeared with the bacteria and treated with dry heat up to 240° F. for 30 minutes were found to be only partially sterilized [ibid., 27, p. 39]. Smeared on wooden, metallic [ibid., 27, p. 38], and burlap surfaces kept both inside the storage cellar and exposed to the sunlight for five winter months, the bacteria persisted in a viable state for the following periods: in the cellar, on wood, burlap, and metal, five, five, and three months, respectively; outside, on wood, metal, and burlap, less than three, two, and three to four months, respectively.

Lane (G. H.). **Potato ring rot control by the use of knife disinfectants.**—Abs. in *J. Colo.-Wyo. Acad. Sci.*, 3, 6, p. 45, 1948.

This information on the control of the spread of ring rot [*Corynebacterium sepedonicum*] from diseased to healthy potatoes has already been noticed from another source [*R.A.M.*, 29, p. 116].

Padmanabhan (S. Y.). **Occurrence of fungi inside Rice kernels.**—*Curr. Sci.*, 18, 12, pp. 442–443, 1 fig., 1949.

Trichoconis padwickii was the predominant fungus cultured on oatmeal agar from the interior of externally healthy, surface-sterilized rice grains [*R.A.M.*, 27, p. 448] of five local types, T. 90, T. 412, T. 812, T. 1145, and T. 1242 at the Central Rice Research Institute, Cuttack 4, Orissa. It occurred in percentages ranging from 51·3 in T. 1242 to 76 in T. 812. The other species identified were *Curvularia lunata* [ibid., 27, p. 314], *Ophiobolus miyabeanus* [ibid., 28, p. 641], and *Nigrospora oryzae* [ibid., 24, p. 128], while a number of undetermined fungi were also present. Between 81·5 and 91 per cent. of all the grains harboured an internal pathogen.

Stevenson (J. A.) & Carpenter (J. B.). **Herbarium records of Pellicularia filamentosa on Hevea Rubber.**—*Plant Dis. Reptr*, 34, 3, p. 70, 1950. [Multilithed.]

A recent examination of United States herbarium collections of *Hevea brasiliensis* and other *Hevea* species has disclosed hitherto unknown records of *Pellicularia filamentosa* [*Corticium solani*: *R.A.M.*, 25, p. 80; 28, p. 65], the causal agent of target spot of *Hevea* rubber. A list of collections is presented originating from Bolivia, Brazil, Costa Rica, Honduras, Peru, and the United States. The collection from Brazil, dated 1901, is the first known record on *Hevea*.

Plant (W.). **A survey of mineral deficiencies in crops on arable land in two English counties.**—*Emp. J. exp. Agric.*, 18, 69, pp. 41–48, 1950.

This is a full account of the results of a nutritional survey of farm crops carried out in 1945 and 1946 in Herefordshire and Somerset, a shorter version of which has already been noticed [*R.A.M.*, 26, p. 563].

Dawson (R. C.). **Decomposition of Wheat straw by some fungi commonly found in Nebraska soils.**—*Soil Sci.*, 67, 6, pp. 467–479, 5 graphs, 1949.

The aerobic decomposition of wheat straw by a number of fungi isolated from Nebraska soils and decomposing plant materials was studied, carbon dioxide and ammonia evolution, pH, and loss in weight being measured during a seven-day period of decomposition at room temperature. Of these criteria, carbon dioxide evolution appears to be the most reliable and convenient method of measuring

decomposition or comparing the widely varying rates of decomposition brought about by different organisms, a high degree of correlation being established between it and loss of weight during the process of decomposition. Most of the fungi seemed to remain fairly constant in their straw-decomposing ability after isolation on artificial media, but a species of *Trichoderma* proved very variable in this respect, its activity decreasing considerably after several months' propagation on Sabouraud's agar. The final pH of the decomposed straw ranged from very acid to distinctly alkaline according to the fungi involved. The oxidase reaction of acid-sensitive species, e.g., *Chaetomium*, may be brought out on tannic acid agar by layering the acid medium with a suitable non-acid substratum before inoculation.

Bottini (E.). **I microelementi nutritivi del terreno agrario. Nota II. Dosamento microchimico del boro nei terreni e nei vegetali.** [The nutrient micro-elements of agricultural soils. II. Microchemical dosage of boron in soils and plants.]—*Ann. Sper. agr.*, N.S., 3, 4, pp. 733–757, 1949. [English summary.]

Continuing his studies on micro-elements in agricultural soils [cf. *R.A.M.*, 28, p. 642], the author reviews the methods of analysing soils and plants for boron and of estimating very small amounts of the element. A colorimetric method based on the isolation of the isomerous rosocyanine from curcumin is suggested. By using standard solutions a curve can be obtained to express the relation between colour intensity and the concentration of boric acid. The limit of sensitivity of this method is 1 γ of boron.

Gilbert (F. C.). **The value of trace elements in fertilizers.**—*Agric. Chemicals*, 4, 2, pp. 24–27, 73, 75, 77, 4 figs., 1949.

After outlining very briefly the development of most of the knowledge concerning trace elements in plants [*R.A.M.*, 26, p. 29; 27, p. 42] during the past 20 years, the author discusses the need for applying deficient trace elements to agricultural soils, the geographical distribution of micro-nutrient deficiencies [ibid., 25, p. 80], the tolerance exhibited by individual strains and species, and the value and advisability of using the various brands of fertilizers offered for sale, which are supposed to contain plant nutrients.

Garrett (S. D.). **A study of violet root rot. II. Effect of substratum on survival of Helicobasidium purpureum colonies in the soil.**—*Trans. Brit. mycol. Soc.*, 32, 3–4, pp. 217–223, 1949.

This information has already been noticed from another source [*R.A.M.*, 28, p. 618].

Chesters (C. G. C.). **Concerning fungi inhabiting soil.**—*Trans. Brit. mycol. Soc.*, 32, 3–4, pp. 197–216, 1949.

The author reviews, with numerous references to the literature, several aspects of the study of soil microfungi, including methods of isolation [*R.A.M.*, 28, p. 240], factors affecting population, methods of studying the fungus population *in situ*, taxonomic studies, distribution, components of specific soil types and profiles, nutrition of soil fungi, their effect on crumb structure, population of the rhizosphere, and mycorrhiza. In conclusion he indicates the lines which appear to hold promise of future developments in the study of this subject.

Michener (H. D.) & Snell (Neva). **Studies on cultural requirements of Claviceps purpurea and inactivation of ergotamine.**—*Amer. J. Bot.*, 37, 1, pp. 52–59, 3 graphs, 1950.

In studies at the Western Regional Research Laboratory, Albany, California, heat sterilized media prepared from germinated wheat supported luxuriant growth of *Claviceps purpurea* [*R.A.M.*, 25, p. 210]. Agar and water were added to the

macerated, germinated wheat to increase the water content. In liquid media the fungus grew until either the sugar or nitrogen was exhausted. Cultures of isolates from sclerotia known to have a high alkaloid content differed morphologically from each other although their nutritional requirements were similar. It appeared that the cultural conditions were such that alkaloids even if formed, were destroyed. When ergotamine tartrate was added to growing cultures, the amount of alkaloid recovered decreased as the incubation period increased. Loss of alkaloid also occurred from uninoculated media.

Forty-ninth Annual Report of the Bureau of Sugar Experiment Stations, Queensland. —53 pp., 3 pl., 2 graphs, 1949.

In the report of the Division of Entomology and Pathology by R. W. Mungomery (pp. 36–45) [cf. *R.A.M.*, 28, p. 242] it is stated that during the period under review there was a further general decrease of Fiji disease in all affected sugar-cane areas [ibid., 29, p. 202]. In the Moreton mill area 3,342 diseased stools were rogued from 4,514 acres. It is hoped that the replacement of P.O.J. 2878 by C.P. 29/116, Vesta, and Q. 47, and continued roguing will keep the disease in check. In the Bundaberg district only 1,015 infected stools were found in 10,597 acres inspected, over half of which occurred on the irrigated Bingera plantation, where susceptible varieties are to be replaced by resistant ones.

Chlorotic streak remains a problem in the wetter districts of Queensland [loc. cit.]. The use of healthy plants from drier areas is considered helpful in combating the disease, but large-scale planting presents many difficulties. In the yield trial in the Moreton area the mean yields per acre of ratoon cane were as follows: diseased, untreated 14 [tons]; diseased, [hot-water]-treated 18·1; healthy, untreated 19·6; and healthy, treated 19·3.

The disease of unknown etiology, ratoon stunting disease or Q. 28 disease [loc. cit.], was transferred to 50 consecutive stools by the cutter-planter, while infection extended to stools here and there for 150 yards further along the row. The cutter-planter also transferred the disease from infected Q. 28 to Q. 50, though the latter appears to be less susceptible. So far there has been no evidence of natural spread or of transmission from the soil. The results of yield trials with healthy and diseased Q. 28, planted in 1947, confirmed the belief that plant crops from diseased material are lighter than from healthy, although the differences are not as pronounced as in the ratoons. The infected yielded 18 to 34 tons per acre, the healthy 28 to 40. The disease continues to be a serious menace to Q. 28 in the Mackay district; it is suspected in newer plantings of Q. 50 and might also be responsible for unexplained poor ratoons of older varieties. It has been reported from the Bundaberg and Maryborough–Bauple districts, and from the Proserpine mill area. Hot-water treatment of diseased setts at 52° C. for 20 minutes was only partially effective. With the co-operation of the Mackay Cane Pest and Disease Control Board a thorough survey of the disease is being carried out, while the recently gazetted Proclamation No. 20 prohibits the removal of plants from diseased or suspect farms, and controls the use of planting material on such farms. Further work on various aspects of the disease is in progress.

Some mosaic disease [ibid., 28, p. 243] was still present in the Burdekin district. It also occurred in the Mackay district, causing some damage in S.J. 2, Comus, E.K. 28, and H.Q. 426. The more popular varieties, however, showed a high degree of resistance. In the Bundaberg district the disease was found in Q. 25 and Q. 42 in alluvial areas, but the acreage devoted to these varieties is rapidly declining. In the Wallaville district Co. 301 was affected and a few stools of Q. 50. South of Bundaberg the disease occurred mainly in Q. 42, causing insignificant losses. In the Moreton area there was an increase of mosaic in Q. 28 and Trojan, the latter showing some damage. In resistance tests at Bundaberg promising inoculated

seedlings from the district appeared to be resistant, while all susceptible standard varieties were highly infected. Local collections and inoculation tests showed that as far as symptoms or severity of infection were concerned, only one strain of mosaic was present in the material.

The Mackay Cane Pest and Disease Control Board destroyed 1,025 stools infected with dwarf [virus] disease [loc. cit.] on 15 farms in the Homebush–Rosella and Walkerston–Palmyra areas. The use of Q. 50 should continue to reduce the incidence of the disease.

An unexpected outbreak of downy mildew (*Sclerospora sacchari*) [loc. cit.] occurred in late January, 1949, on a farm in the Hambledon area in North Queensland, where the disease has not been observed for many years. It spread to two neighbouring fields, affecting altogether 93 Trojan stools, which were destroyed. The ploughing of infected fields, inspection of all surrounding fields, prevention of the removal of plants from diseased or neighbouring farms, and the planting of resistant varieties within a half-mile radius should prevent recurrence. In the Bundaberg district only 74 infected stools were found in 10,597 acres inspected.

Owing to dry weather during the latter months of the 1948 harvest, red rot (*Physalospora tucumanensis*) [ibid., 28, p. 244] was widespread in the Mackay district and in the drier areas of the far north. Q. 50 was severely affected, Q. 28 less so.

Despite late planting, germination of setts in the Lower Burdekin district was not impeded by *Ceratostomella paradoxa* [loc. cit.], as a result of large-scale dipping in a mercurial solution prior to planting [ibid., 29, p. 172]. In a trial abavit S was as effective as aretan. The disease was fairly common throughout North Queensland, affecting Trojan and Q. 50 more severely than Badila. In a trial at Mackay it was found that although the disease did not appear, the dipping of cut setts in a mercurial solution improved the germination in comparison with the dipping of the stems before cutting into setts.

For the first time since 1929 gumming disease (*Xanthomonas vasculorum*) was not reported from commercial fields. It cannot be stated yet, however, that the disease has been eradicated, since the last known diseased fields in the Mossman area were ploughed out only after the 1948 harvest. In trials Pindar and Orion were resistant.

Leaf scald (*X. albilineans*) and red stripe or top rot (*X. rubrilineans*) were not serious. The former occurs now only north of Townsville, and can be kept under control by a rigid selection of planting material. Some red stripe appeared in various parts of the sugar belt, but did not develop into the top-rot stage. Pokkah boeng (*Fusarium moniliforme*) [*Gibberella fujikuroi*: ibid., 26, p. 32] occurred in the northern areas after the onset of the wet season; Q. 50 was very susceptible, but affected stems mostly recovered.

Rind disease (*Pleocyta sacchari*) [ibid., 27, p. 385] attacked Q. 49 severely in all non-irrigated areas, causing appreciable losses. Some fields of P.O.J. 2878 and Q. 47 stand-over were also affected, but to a lesser degree.

In the report of the Division of Soils and Agriculture (pp. 15–17), L. G. Vallance states that applications of molasses had a far-reaching effect on soil tilth and brought about an increase in the number and stability of the aggregates present. In such soils a vigorous fungal growth occurred rapidly and mycelial threads interlaced the soil mass, causing a considerable increase in crumb structure. Applications of molasses at the rate of 3, 6, and 12 tons per acre to three different cane soils resulted in a marked increase in the number of stable aggregates, the effect varying with the amount of molasses applied.

Petrak (F.). **Südamerikanische Mikromyzeten.** [South American microfungi.]—*Sydowia*, 1, 4–6, pp. 289–312, 1947.

Included in this critically annotated list of fungi from South America are 14 new species.

Ahmad (S.). **Fungi of Pakistan.—I.**—*Sydowia*, 2, 1–6, pp. 72–79, 1948.

Among the 28 micro-fungi in this critically annotated list are 14 new species, one new variety, and two new combinations, including *Phyllosticta ficina* n.sp. on *Ficus elastica* leaves.

Doidge (E[thel] M.). **South African rust fungi. Part V.**—*Bothalia*, 4, 4, pp. 895–918, 19 figs., 1948.

This further critically annotated contribution to the knowledge of Uredinales from South Africa [*R.A.M.*, 21, p. 47] and neighbouring territories comprises 40 records, including ten new species, two new varieties, and one new combination. Mention may also be made of *Puccinia allii* on garlic, *P. helianthi* on sunflower, and *Uromyces vignae* on cowpea.

P. allii has assumed a destructive character of late years in the Long Kloof area of the Cape Province. *P. helianthi* appears to be a recent introduction into South Africa. In 1943 it was collected by Hopkins at Bulawayo and by Cardoso at Umbeluzi, Mozambique [cf. ibid., 29, p. 89], and in 1944 specimens from the northern Transvaal, where a severe outbreak occurred in 1943, were identified as *P. helianthi*. The differences between *U. vignae* and *U. appendiculatus* observed by Fromme [ibid., 3, p. 566] were generally characteristic of the South African specimens.

Wakefield (E[lsie] M.) & Hansford (C. G.). **Contributions towards the fungus flora of Uganda. IX. The Uredinales of Uganda.**—*Proc. Linn. Soc. Lond., 1948–1949*, pp. 162–198, 26 figs., 1949.

This further contribution of Uganda fungi [cf. *R.A.M.*, 23, p. 409] is an annotated list of the rusts, some of which have already been recorded [ibid., 16, pp. 550, 838; 17, pp. 345, 415; 23, p. 79] in the country. It includes *Phakopsora desmium* on cotton, and the following new species: *Hemileia smallii* on leaves of *Strophanthus courmontii*, *Diorchidium brachiariae* on leaves and culms of *Brachiaria* sp., *Uromyces alysicarpi* on leaves of *Alysicarpus glumacei*, *U. ocimi* on stems of *Ocimum menthaefolium*, and *Aecidium crassocephali* on leaves and stems of *Crassocephalum crepidioides*. A host-fungus index is provided.

Isaac (I.). **A comparative study of pathogenic isolates of Verticillium.**—*Trans. Brit. mycol. Soc.*, 32, 2, pp. 137–157, 2 pl., 3 figs., 4 graphs, 1949.

Taxonomic studies were made at Cambridge and East Malling on *Verticillium* strains from sainfoin [*Onobrychis sativa*: *R.A.M.*, 25, p. 504], antirrhinum [*Antirrhinum majus*], chrysanthemum, tomato, potato, hop [ibid., 28, p. 420], raspberry, and soil, forming only microsclerotia (M); from cucumber, tomato, hop, and soil, forming dark resting mycelium (D); and from soil, forming chlamydospores (C). In culture the optimum temperature for the growth of all isolates was 22·5° C.; at 30° only the M and C strains developed. The optimum pH for the D strains was 8 to 9·6, and for the others 5·3 to 7·2. The M and C types grew well on Dox medium with sucrose, dextrose, or maltose, but poorly with glycerine, while the D strains developed well with glycerine and poorly with sucrose and dextrose. For all the strains the best nitrogen source was the ammonium ion.

The M strain from sainfoin was pathogenic to sainfoin and tomato at 21·5°, 25°, and 27°, but the D strain from cucumber did not induce wilt in these hosts at the two higher temperatures but did so at 21·5°. At normal temperatures the D types were generally the most rapidly pathogenic, but only those from hops induced wilt in sainfoin.

The author considers that the microsclerotial, dark mycelium, and chlamydospore strains are, respectively, *V. dahliae*, *V. albo-atrum*, and *V. nigrescens* [ibid., 25, p. 504]. The three types remained constant throughout. In the original description of *V. albo-atrum*, Reinke and Berthold maintained that there were no true

tissue bodies or sclerotia. Their drawing suggests the resting mycelium of the author's dark mycelium strain from cucumber and furthermore the D strains never showed 'budding' characteristic of sclerotia formation. *V. albo-atrum* var. *tuberosum* of Rudolph [ibid., 10, p. 757; it is described on p. 252 of this work], produces only carbonized hyphae and no sclerotia and is evidently synonymous with the similar var. *caespitosum* of Wollenweber [ibid., 12, p. 117; 19, p. 368]; both, in the author's opinion, are *V. albo-atrum* as originally described.

The microsclerotial strains correspond closely to *V. dahliae*. The evidence obtained in the present work provides ample reason for dismissing the contention that *V. albo-atrum* and *V. dahliae* are the same. It is considered that the consistent difference in the morphology of the resting bodies in culture, differences in temperature relations and pathogenicity, and for the sake of convenience, the microsclerotial type should be given specific rank.

The chlamydospore-producing fungus resemble *V. nigrescens*, originally described as saprophytic, but the fact that the author's fungus was pathogenic to various hosts in inoculation tests does not justify a sub-division of the species.

Schussnig (B.). **Stammesgeschichtlicher Formenwandel und Gestaltungstypen im Reich der Pilze.** [Phylogenetic changes of form and structural types in the realm of the fungi.]—*Sydowia*, 2, 1–6, pp. 83–230, 1948.

The author's exhaustive study on the phylogeny of the fungi [cf. *R.A.M.*, 28, p. 249] in the light of present knowledge has culminated in a revised scheme for their classification, in which the group Mycophyta is divided into 12 sections, namely, (I) Myxomycetes, with two classes, Myxomycetineae (comprising two orders) and Acrasieae; (II) Archimycetes, with six classes, viz., Chytridinae (seven orders), Blastocladinae, Anisochytridinae, Monoblepharidinae, Myrioblepharidinae, and Spermophthorinae; (III) Plasmodiomycetes, with two classes, Plasmodiophorinae and Haplosporidinae; (IV) Dinomycetes (= Blastodiniales); (V) Blastomycetes (= Saccharomycetes); (VI) Phycomycetes, with three classes, Woroninae (two orders), Lagenidinae, and Oomycetinae (two orders); (VII) Protomycetes, with two classes, Protomycetinae and Taphrinae; (VIII) Zygomycetes, with two classes, Mucorinae (two orders) and Endomycetinae (two orders); (IX) Ustilagomycetes (= Ustilagineae); (X) Uromycetes (= Uredineae); (XI) Ascomycetes; and (XII) Basidiomycetes, followed as usual by the Lichenes and Fungi Imperfecti.

Petrak (F.). **Über Gibbera Fr. und verwandte Gattungen.** [On *Gibbera* Fr. and related genera.]—*Sydowia*, 1, 4–6, pp. 169–201, 1947.

This critical discussion of the taxonomy and synonymy of *Gibbera* and related genera comprises, *inter alia*, emended diagnoses of *Pseudoparodia* and *Gibbera* and descriptions of *Xenodimerium* n.gen., with the type species *X. mycophilum* n.sp., forming jet-black, often extensive, felty to velvety coatings on oak, *Pasania*, and *Lithocarpus*; and of *Neogibbera* n.gen., represented by *N. sinensis* n.sp., parasitic on the leaves of *Quercus semicarpifolia* in China. A key is given to these genera and *Trichodothis*, *Spilosticta*, and *Parodiella*.

Venturia myrtilli Cooke and *V. elegantula* Rehm on *Vaccinium myrtillus* [*R.A.M.*, 25, p. 185] are given as synonyms of *G. myrtilli* n.comb. and *G. elegantula* n.comb. respectively, while the apple scab fungus (*Venturia* [*inaequalis*]) is renamed *S. cinerascens* (Fleischh.) Petr. n.comb., since the author maintains *Spilosticta* to be distinct from *Endostigme* and does not accept Jørstad's combination *E. cinerascens* [ibid., 24, p. 453; 29, p. 262].

Ellis (M. B.). **Tetraploa.**—*Trans. Brit. mycol. Soc.*, 32, 3–4, pp. 246–251, 2 figs., 1949.

Tetraploa aristata [*R.A.M.*, 10, p. 446] and *T. ellisii* are re-described and an account is given, for the first time, of the cultural characters and spore develop-

ment and dispersal in the former together with its host range and geographical distribution. Notes on *T. divergens*, *T. muscicola*, and *T. scabra* are appended.

Bisby (G. R.) & Ellis (M. B.). **Stachybotrys dichroa Grove.**—*Trans. Brit. mycol. Soc.*, 32, 2, pp. 158–161, 2 figs., 1949.

Stachybotrys dichroa, which grows on dead herbaceous stems in England, has been shown to be quite distinct from *S. atra* [*R.A.M.*, 23, p. 151; 24, p. 389]. In contrast to the latter species it produces little or no superficial mycelium, has quite hyaline, simple conidiophores, almost cylindrical phialides, and conidia which are often obliquely attenuated at the base. In culture on potato dextrose agar colonies of *S. dichroa* are bright orange colour in reverse; colonies of *S. atra* are usually dark olive. Reference is also made to another, apparently so far undescribed species of *Stachybotrys*, found only on dead stems of *Oenanthe crocata* in Guernsey.

Skinner (C. E.). **Generic name for imperfect Yeasts, Cryptococcus or Torulopsis?**—*Amer. Midl. Nat.*, 43, 1, pp. 242–250, 1950.

The author discusses the erection of the genus *Torulopsis* and the various diagnoses and type species assigned to it [*R.A.M.*, 14, p. 192]. As the type which Lodder used (*T. pulcherrima* = *T. rosea*) has been removed from the genus, *Torulopsis* could not be maintained for the remaining species unless, as the author thinks, *T. rosea* (Berlese's earlier type) is not identical with *T. pulcherrima*, in which case the name *Torulopsis* is still available. *Cryptococcus* is also discussed; this name has priority over *Torulopsis* unless the former is considered a *nomen dubium* or *nomen confusum*. Reasons are given for dividing the genus and using the name *Torulopsis* to accommodate all fermenting, anascosporogenous, non-mycelial, non-apiculate yeasts. All except one, of little importance, are non-pathogenic. *Cryptococcus* would include the non-fermenting, mostly parasitic forms.

Castellani (E.) & Ciferri (R.). **Mycoflora Erythraea, Somala et Aethiopica.** [Mycoflora of Eritrea, Somaliland, and Ethiopia.]—*Suppl. Atti Ist. bot. Univ. Pavia*, Ser. 5, H, 52 pp., 1950. [Mimeographed.]

The first supplement has now been published to the list of plant diseases observed in 'Italian East Africa' [*R.A.M.*, 26, p. 149], containing 926 species in 324 genera. Species not recorded in C.M.I. distribution maps include *Fomes lignosus* [C.M.I. map 176], *Elsinoe australis* [55] in Eritrea, *E. fawcetti* [125] in Italian Somaliland, *Phytophthora infestans* [109] in Eritrea and Abyssinia, and *Venturia inaequalis* [120], *Puccinia glumarum* [97], and *P. helianthi* [195] in Abyssinia.

Bremer (H.) & Petrak (F.). **Neue Mikromyzeketen aus der Türkei.** [New microfungi from Turkey.]—*Sydowia*, 2, 1–6, pp. 311–316, 1948.

Two of the four new species of fungi herein fully described from Turkey are parasitic on trees, namely, *Cercospora bremeri* on mulberry and *Cercoseptoria quercina* on oak.

Bremer (H.) & Petrak (F.). **Neue Kleinpilze aus der Türkei.** [New microfungi from Turkey.]—*Sydowia*, 1, 4–6, pp. 248–263, 1947.

Among the 12 new species of Turkish fungi herein fully described may be mentioned *Asteromella pistaciarum* on living leaves of the pistacio nut, *Marssonina celtidis* on *Celtis tournefortii*, and *Cercosporella karelii* on *Vitex agnus-castus*.

Petrak (F.). **Ein kleiner Beitrag zur Pilzflora von Südfrankreich.** [A small contribution to the mycoflora of the south of France.]—*Sydowia*, 1, 4–6, pp. 206–231, 1947.

In this critically annotated list of fungi collected by Drs. K. H. Rechinger and

H. Sleumer in the south of France in 1944, nine were identified by the author as new species, including *Septoria acericola* on living foliage of *Acer monspessulanum*.

PETRAK (F.). **Zwei neue Sphaeropsideen aus der Schweiz.** [Two new Sphaeropsideae from Switzerland.]—*Sydowia*, 2, 1–6, pp. 239–243, 1948.

One of the two new species of Sphaeropsideae herein fully described, *Septoria blumeri* n.sp., is a parasite on *Lathyrus luteus*.

PETRAK (F.). **Kleine Beiträge zur Pilzflora von Tirol.** [Small contributions to the mycoflora of the Tyrol.]—*Sydowia*, 1, 4–6, pp. 313–327, 1947.

Among the fungi collected in the environs of Innsbruck, Austria, in July, 1940, were *Mytilidion decipiens* (Karst.) Sacc. on the youngest twigs of *Juniperus nana*, still bearing living needles; and *Ramulaspera salicina* (Vestergr.) Lindr., parasitic on *Salix* sp. The list further comprises four new species.

PETRAK (F.). **Pilze aus Ekuador.** [Fungi from Ecuador.]—*Sydowia*, 2, 1–6, pp. 317–386, 1948.

Included in this critically annotated list of Ascomycetes, Fungi Imperfecti, and one rust, forming part of the material collected by the late H. Sydow in Ecuador in 1937–8 [cf. *R.A.M.*, 21, p. 163], are 33 new species.

PETRAK (F.). **Kritische Studien über chinesische Pilze.** [Critical studies on Chinese fungi.]—*Sydowia*, 1, 4–6, pp. 332–377, 1947.

The many errors in Keissler's determinations of Handel-Mazzetti's specimens of Chinese fungi (Symbolae Sinicae II) necessitated a thorough re-examination of the material, the results of which are here presented and discussed at length. Three new species are described.

ESFANDIARI (E.). **Beiträge zur iranischen Pilzflora.** [Contributions to the Iranian mycoflora.]—*Sydowia*, 1, 4–6, pp. 161–168, 1947.

Included in this fully annotated list of fungi collected in Persia [cf. *R.A.M.*, 29, p. 124] (five new species and one new name) are *Coniothyrium iranicum* n.sp. on pomegranate and *Tuberculina hyalospora* n.sp. in association with *Darluca filum* [ibid., 27, p. 560] in the uredosori of *Tranzschelia punctata* [*Puccinia prunispinosae*] on *Prunus spinosa* leaves.

SĂVULESCU (T.). **Les espèces de Peronospora Corda de Roumanie.** [The species of *Peronospora* Corda of Rumania.]—*Sydowia*, 2, 1–6, pp. 255–307, 1948.

This is a complete list of the species of *Peronospora* hitherto collected in Rumania [cf. *R.A.M.*, 14, p. 471], with a section key, host list, and details of distribution. The present contribution brings the total of species to 202 on 282 hosts. New records for the country include *P. cheiranthi* [*P. parasitica*] on wallflower, *P. corollae* on *Campanula persicifolia*, *P. ducometi*, common this year [? 1948] on buckwheat crops in Neamt, *P. fabae* [*P. viciae*] on broad bean, and *P. oerteliana* on primrose and *Primula elatior*.

PETRAK (F.). **Kleine Beiträge zur Pilzflora von Australien und Polynesien.** [Small contributions to the mycoflora of Australia and Polynesia.]—*Sydowia*, 1, 4–6, pp. 264–276, 1947.

Nine new species of fungi described from the Fiji Islands, New Zealand, Kerguelen Island, Tierra del Fuego, Australia, and Hawaii, including *Phyllachora derridicola* on living leaves of *Derris uliginosa* in Fiji.